TOWN OF STEVENSVILLE

Water System Improvements

Preliminary Engineering Report

November 2009 UPDATE

prepared by:

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Unmatched Experience. Uncompromising Standards.

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PRELIMINARY ENGINEERING REPORT
TOWN OF STEVENSVILLE WATER SYSTEM IMPROVEMENTS

TABLE OF CONTENTS

APPENDICES:

Appendix A: Background Information

Planning Area Map
FEMA Flood Plain Map
Map of Existing Water System
Infiltration Gallery Map
Current Sanitary Survey
2006 Hughes Leak Detection Survey

Appendix B: Environmental Checklist

Environmental Checklist
Soils Map & Report
Agency Comment
Well Field Wetlands Delineation

Appendix C: Water System Information & Model

Well Logs
ISO Fire Flow Requirements
Proposed Transmission Main Routes
Preferred Alternative System Map
Existing System Fire Flows
Proposed System Fire Flows
Creekside Booster Station Approval

Appendix D: Well Field Information

Twin Creeks PWS 6
Twin Creeks Hydrogeologic Study
Western Groundwater Services – Source Water Protection Plan

Appendix E: Infrastructure Access Fee & Water Rate Structure

IAF Resolution
Water Rate Resolution
HDR Water & Sewer Rate Study

Appendix F: Water Rights Abstracts

Appendix G: Schematic of Proposed Improvements

Appendix H: Detailed Cost Estimates

Appendix I: Short Lived Asset Assessment

Appendix J: Public Participation

Section I: EXECUTIVE SUMMARY

The Town of Stevensville contracted with Professional Consultants, Inc. (PCI) in June, 2004, to inventory and study the Town's water supply, treatment and distribution systems and prepare a Preliminary Engineering Report (PER) in conformance with the "*Uniform Application for Montana Public Facility Projects*". This PER is to provide background and support documentation for applications to State and federal funding agencies for grant and loan funds to accomplish the identified improvements. This is an update to the *Town of Stevensville, Water System Improvements, Preliminary Engineering Report, as Amended September 2007.*

The Town of Stevensville's current water system is in drastic need of upgrades. In addition to significant sanitary deficiencies, non-conformance to Circular DEQ-1, and possible non-compliance with EPA surface water treatment rules; the system is currently losing excessive amounts of finished water to leaks in the distribution system. Based on 2008 production and wastewater treatment plant flows these leaks are estimated from 60,000 to 390,000 gallons per day during winter months, and may be higher during peak summertime use. The combination of these deficiencies is making the system more expensive and difficult to operate, while only providing marginal quantity and quality water to the Stevensville water system users. In addition, the system is currently unable to meet required ISO fire flows. Based on the water model all but 6 junctions failed to deliver adequate fire flow during peak day demands.

This report focuses on the Town's water system and provides documentation of the needed improvements. Alternative improvements for water supply, treatment, storage, transmission, distribution system, and metering are addressed in this report. Alternatives and their associated costs will be evaluated to address the following issues with the Town's water system:

- Reduce risks to public health and safety.
- Install meters on all sources and services to encourage water conservation & account for lost water.
- Correct deficiencies in the transmission and distribution system to minimize lost water and provide adequate capacity for fire and peak day flows.
- Meet requirements of DEQ Circular 1, including:
    - Source Capacity
    - Water Quality
    - Backup Power
    - Storage Capacity
- Meet current EPA water treatment requirements

The following alternatives for each element of the water system are explored in this PER update:

A. Water Supply & Treatment

- No action
- Other water supply systems
- Rehabilitation of existing wells, infiltration gallery, and treatment plant
- Identify new well site/sites
- New or alternative surface water source and treatment plant

B. Water Storage

- No action
- Tank replacement in existing location
- New storage tank with removal of existing tank
- New storage tank keeping existing tank

C. Water Transmission

- No Action
- Rehabilitate 8" water main in Middle Burnt Fork Road in place
- Replace 8" water main in Middle Burnt Fork Road in existing location
- New transmission main along alternate route

D. Distribution Improvements

- No action
- Full distribution replacement
- Main upsizing and looping of dead end mains
- Add additional pressure zone

E. Metering

- No action
- Install meters on all service connections and supplies, upgrade existing meters with radio-read heads.

F. Recommended Improvements

The preparation of this PER was complicated since the Town of Stevensville is not completely metered. The lack of accurate production and use data made differentiating between excessive use and system losses difficult. Historic use records from other systems and estimations from Stevensville's metered data were used to project expected demands on the system now and as leaks are repaired. However, due to the unknown leaks in the system, some improvements, such as storage, are better left alone at this time until more accurate information is available to properly size the improvements, as considerable cost savings may be realized by reductions in the average day flows.

The recommendations of this PER include the following improvements:

- Install remote read water meters on all services served by the Town, in order to account for all water sold by the Town, and move to monthly billing.
- Move the Town's water supply from the infiltration gallery and scattered wells to a consolidated well field at the Twin Creeks Well Field site. This will allow for all sources to be controlled, treated, and metered at one location, and will provide for better protection of the source supply.
- Abandon the existing 8" cast iron water main in Middle Burnt Fork Road from the existing reservoir to Park Street, and install a 16" transmission main from the Twin Creeks Well Field to Town along ALC way connecting at the intersection of Park and 5th Street.
- Improve the distribution system in Town to provide a 12" "backbone" along Church Street to deliver fire and peak flows to Downtown and the School. Loop existing water mains on the north side of Town to increase flows and improve water quality on dead end mains.
- Install Pressure Reducing Valves (PRV) and a booster station to serve the east end of Town, reducing dangerously high water pressures on the west side of town to less than 100 psi and increasing the marginal pressures in the Creekside Meadows subdivision.

It is recommended that improvement of the Town's storage facility is delayed until accurate information is available from monthly water metering to determine actual water usage of the Town, and leaks are reduced to lower the overall storage requirements of the system. Considerable savings will be realized by the Town, and potential problems associated with an oversized storage tank will be avoided by delaying the design and construction of new storage facilities.

G. Project Cost Summary

It is estimated that this project will cost approximately $4,220,831 to complete Phases II and III of the project. Additional funds will be required to complete Phase IV which includes the upgrades to the storage facility. A breakdown of project costs and secured funding for Phases II & III is shown below:

Table I.G.1 Project Cost Summary

PHASE II IMPROVEMENTS

Water System Improvements Phase II Scope of Work and Estimated Costs		
Description		**Estimated Cost**
Meter Installation	$	243,072
Engineering & Contract Administration	$	24,026
Contingency	$	24,307
Metering Total	**$**	**291,405**

Transmission Main Installation	$	852,863
Road Repair	$	108,723
Engineering & Contract Administration	$	144,238
Contingency	$	96,159
Transmission Main Total	**$**	**1,201,983**

Phase II Improvement Summary		
Meter Improvements	$	291,405
Transmission Main Improvements	$	1,201,983
Total Phase II	**$**	**1,493,388**

Phase II Funding Summary		
Meter Improvements - USACE/WRDA 2008	$	175,000
Transmission Main Improvements - USACE/WRDA 2008	$	487,500
Total Phase II Funding Secured	**$**	**662,500**

Phase II Funding Needed		
Total Phase II Funding Needed	**$**	**830,888**

PHASE III IMPROVEMENTS

Water System Improvements Phase III Scope of Work and Estimated Costs		
Description		**Estimated Cost**
Water Supply Well Installation	$	380,000
Pumphouse & Treatment	$	396,250
Engineering & Contract Administration	$	116,438
Contingency	$	77,625
Water Supply & Treatment Total	**$**	**970,313**
Distribution System Improvements	$	1,537,183
Decommission Infiltration Gallery	$	70,000
Engineering & Contract Administration	$	241,077
Contingency	$	160,718
Distribution System Improvements Total	**$**	**2,008,979**
Pressure Reducing Valves & Booster Station	$	165,000
Engineering & Contract Administration	$	12,750
Contingency	$	16,500
PRV & Booster Station Total	**$**	**194,250**

Phase III Improvement Summary		
Water Supply & Treatment Improvements	$	970,313
Distribution System Improvements	$	2,008,979
Pressure Reducing Valves & Booster Station	$	194,250
Total Phase II	**$**	**3,173,541**

Phase III Funding Summary		
RRGL 2008	$	100,000
TSEP 2008	$	500,000
Total Phase II Funding Secured	**$**	**600,000**

Phase III Funding Needed		
Total Phase II Funding Needed	**$**	**2,573,541**

PROJECT SUMMARY

Total Project Cost	**$**	**4,666,929**
Total Project Funding To Date	**$**	**1,262,500**
Total Funding Needed To Complete Project	**$**	**3,404,429**

H. Project Cost per User

Based on the above cost estimates and the Water and Sewer Rate Study performed by HDR (included in Appendix E), the following increases in rates are expected from this project through 2014 if no additional grant funds are available:

Table I.H.1 HDR Recommended Rate Increases

Projected Rate Increases w/o Additional Grant Funding	
2010	40.0%
2011	30.0%
2012	3.0%
2013	3.0%
2014	3.0%

Based on current interest rates, loan terms, and the potential to receive approximately 40% grant the Town of Stevensville wishes to pursue funding from USDA Rural Development, if available. Based on 60% loan and 40% grant from USDA Rural Development a rate increase of approximately $10.40 per EDU could be expected including a 10% contingency to cover the

required debt service. Under this funding scenario the estimated monthly water rates would be as follows for each service size.

Table I.H.2 Estimated Rate Increase with 40% Grant Funding

Meter Size	Current Monthly Rate	Expected Monthly Rate
3/4 Inch (1 EDU)	$19.27	$29.67
1 Inch (1.79 EDU)	$34.35	$52.97
1-1/2 Inch (4 EDU)	$76.56	$118.16
2 Inch (7.14 EDU)	$136.53	$210.79

I. Project Implementation

It is the goal of the Town to proceed with these improvements as soon as possible. However, additional funding is required to bring this project to a successful completion. Based on discussions with USDA – Rural Development and TSEP, This project has the greatest chance of success if Phases II & III are completed simultaneously. The estimated funding required to complete Phases II & III of this project is $3,404,429. Current funding would allow for the design and bidding of the project to be awarded by March, 2010.

Based on the above projected user rates, obtaining the remaining funds required for the project from USDA – Rural Development with 60% loan and 40% grant would allow the Town to complete the water project without excessive increases in rates. It is our understanding that the PER must be approved by USDA Rural Development and construction contracts awarded by March 2010 to receive funds.

The Town, with the help of John Anderson, has worked diligently over the last year to obtain a well field, perform a hydrogeologic investigation to determine the quantity and quality of water available, obtain easements for required transmission main routes, and determine the financial health of their water system funds.

However, in order to achieve the extensive goals and fulfill the water system needs of this growing community, the Town must continue to improve their metering data, continue leak detection, and repair any leaks found in the distribution system to achieve the reductions in lost water set forth in this PER. Accurate metering data and extensive leak reductions will allow the Town to proceed to Phase IV and complete their water system improvement project.

It is this PER's recommendation that the Town move forward with the improvements as proposed by obtaining the funding from USDA – Rural Development. A PER update addressing the storage tank will be prepared at a later date to address Phase IV - Storage.

Section II. PROBLEM DEFINITION

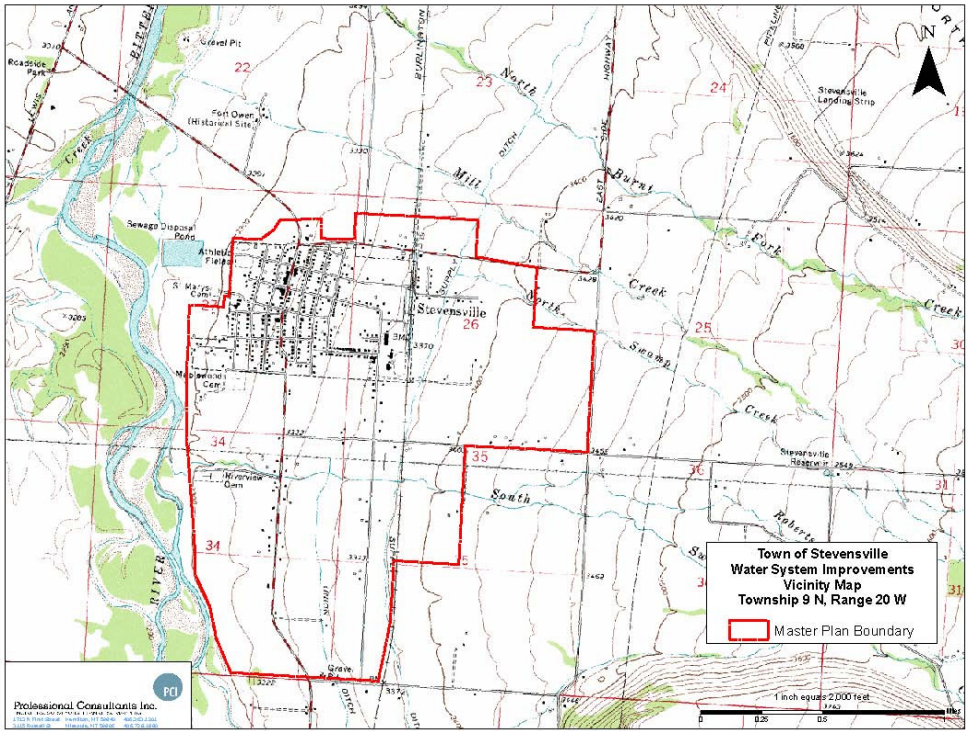
A. Existing and Planned Service Area.

1. Location

The Town of Stevensville is located in the Bitterroot Valley in the northern portion of Ravalli County approximately 25 miles south of the City of Missoula in western Montana. It is situated on a valley plain bounded on the west by the Bitterroot Mountains and on the east by the Sapphire Mountains. Next to Hamilton, it is the second largest of 10 communities within Ravalli County. Stevensville is on the east side of the Bitterroot River and east of US Highway 93. The Town is located at 46 degrees 30.57 minutes north latitude and 114 degrees 5.77 minutes west longitude.

The Stevensville Planning Area for this study encompasses the present Town Limits and unincorporated county areas to the northeast, east and south, and is comprised of about 1,438 acres (2.25 square miles). In this area there is sufficient land to support the future growth of the Town. Growth is currently occurring in this area and is expected to continue during the planning period. The Planning Area includes the extended zoning district as adopted by ordinance of February 8, 2007, as well as other areas of logical extension of municipal services. Further expansion to the west is constrained by the Bitterroot River and its associated floodplain. A map of the Planning Area is shown below in Figure I.A.1.

Figure I.A.1 Water System Planning Area



2. Physical Characteristics of the Area

2.1 Geology:

According to information in the book *"Roadside Geology of Montana"* by David Alt and Donald W. Hyndman, the principal geologic elements deeply underlying the Stevensville area are granite rocks of the Idaho Batholith. Overlying the basement rock are valley fill sediments of the Renova formation, eroded off the Bitterroot Mountains to the west. Atop this are more geologically recent sediments from successive washouts from Glacial Lake Missoula during several cycles of heavy glaciation followed by periods of melting and catastrophic flooding. These sediments have been reworked and redistributed by the Bitterroot River during more recent geological history.

Stevensville sits on a low terrace adjacent to the relict flood plain of the Bitterroot River, which meandered widely during recent geological history. Surface deposits underlying the area consist of alluvium of modern channels and flood plains (quaternary) consisting of well-rounded gravel and sand with lesser amounts of silt and clay.

2.2 Topography:

The surface topography of Stevensville is relatively flat sloping from east to west towards the Bitterroot River at about 1 to 2 percent. The average surface elevation of the Town is approximately 3,370 feet MSL. A topographic map of the planning area is included in Appendix A.

2.3 Soil Types:

The majority of the Town of Stevensville, particularly the northern, central and southern portion, is situated on soil classified as Dominic Cobbly Loam (NRCS mapping symbol "Da") on slopes less than 2%. This soil type is described as shallow, gravelly and cobbly, loose sandy soils that occur on low fans and terraces on the east side of the Bitterroot Valley. This soil type is characterized by very dark grayish-brown, coarse, porous surface soils and dark grayish-brown cobbly or gravelly sandy loam subsoils. These soils have very rapid permeability. Depth to groundwater normally ranges from a high of 9 feet below the land surface (BLS) to more than 30 feet BLS.

The northeastern portion of the Town and some areas southeast of the Town are situated on soils of the Corvallis Series (NRCS mapping symbols "C3u" and "C3r"). Soils in this series are described as loam or silt loam to the depth of 48 inches and underlain by sands or mixed sands and gravel with high permeability (6.3 to 20.0 inches per hour). Depth to seasonal groundwater in these areas is indicated at only one to two feet BLS.

Soils in the western portion of the Town at the edge of the Bitterroot River floodplain and in the eastern segment of the planning area, generally outside of the existing Town limits but within the planning area, consist of the Grantsdale Series (NRCS mapping symbols "G2n" and "G21"). This soil series consists of loam and cobbly loam of low permeability in the upper part and sand,

gravel and cobbles of high permeability in the lower part of the soil profile. Seasonal groundwater is reported as being 2 to 5 feet BLS.

A soils map of the area is included with the Environmental Checklist in Appendix B.

2.4 Groundwater:
As noted above under soil types, groundwater depths in the area around Stevensville are relatively shallow. Thus, dewatering of pipeline trenches and structure foundations will likely be required during the construction of system improvements.

A review of well logs in the area indicates that typical depths to groundwater are in the range of 3 to 20 feet BLS. The depth to groundwater also varies with the irrigation of the surrounding land with high groundwater being reported during the months of more intense irrigation of nearby farmlands in June, July and August. The general direction of groundwater flow underlying the area is to the west towards the Bitterroot River. The river surface generally represents the governing "line sink" relative to groundwater levels and localized hydrogeology.

2.5 Surface Water:
The Bitterroot River is the primary surface water body in the area and is located at the western fringe of the Stevensville planning area. Waters in this river are classified by MDEQ as "B-1" and are considered suitable for drinking after conventional treatment. Other suitable uses under this classification include bathing, swimming and aquatic recreation, growth and propagation of salmonid fishes and aquatic life, waterfowl and furbearer habitat, and agricultural and industrial water supply. Flows in the river vary primarily in response to rainfall and snowmelt from the surrounding mountains. In addition, flows in the river are regulated to a considerable extent by the Painted Rocks Reservoir, located on the West Fork of the Bitterroot River upstream of Conner, Montana. In addition to this base flow, four (4) other major tributary streams (Sleeping Child Creek, Skalkaho Creek, Blodgett Creek and Bear Creek) contribute substantial flows upstream of Stevensville.

Flows from the river and some of the primary tributary streams are diverted into irrigation ditches to support agricultural activities in the valley. The Supply Ditch is the primary irrigation ditch within the Planning Area and runs from south to north through the Town of Stevensville.

Within the Planning Area there are two smaller tributaries of the Bitterroot River that are of significance, Mill Creek and North Swamp Creek. The Town of Stevensville obtains a substantial portion of its raw water supply indirectly from these two streams by means of a subsurface infiltration system (see map in Appendix A) of tile pipe laid parallel between the two creeks. A direct discharge from North Swamp Creek is available in winter months. MDEQ considers the water from this source to be "groundwater under the direct influence of surface water" and therefore subject to EPA Surface Water Treatment Requirements.

2.6 Climatological Information:

Climatological information for the Town of Stevensville is summarized in **Table II.2.6.A.** The information in this table was obtained from the National Climatic Data Center (NCDC) in Asheville, NC and covers the period from 1911 to 2004. Average annual precipitation is 12.56 inches, which places Stevensville in the "semiarid" category. On an annual average basis, the average maximum temperature is 58.5°F and the average minimum temperature is 31°F.

TABLE II.2.6.A

LOCAL CLIMATOLOGICAL SUMMARY FOR STEVENSVILLE, MONTANA (247894)
Period of Record Monthly Climate Summary
Period of Record : 8/23/1911 to 6/30/2004

Average	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Avg
Max. Temp. (F)	33.1	39.7	48.8	59.5	68.0	75.2	84.8	83.4	72.1	59.1	43.3	34.6	58.5
Min. Temp. (F)	14.9	19.0	24.5	30.6	37.4	44.0	47.1	45.3	38.1	30.5	23.1	17.0	31.0
Total Precip. (in.)	1.07	0.85	0.78	0.83	1.49	1.65	0.87	0.90	1.07	0.88	1.06	1.09	12.56
Total SnowFall (in.)	7.7	5.8	4.1	0.4	0.1	0.0	0.0	0.0	0.0	0.2	3.0	5.9	27.3
Snow Depth (in.)	3	2	1	0	0	0	0	0	0	0	1	2	1

Percent of possible observations for period of record.
Max. Temp.: 98.4%, Min. Temp.: 98.3%, Precipitation: 98.7%, Snowfall: 47.2%, Snow Depth: 48.3%

2.7 Floodplains:

Appendix A includes the FEMA floodplain map for the Planning Area. The Planning Area and the proposed improvements are located outside of the 100-year floodplain of the Bitterroot River.

2.8 Vegetation and Wetlands:

In view of the fact that Stevensville is the oldest permanent settlement in Montana, dating back to 1841, most, if not all of the original native vegetation within the existing town limits has been replaced with cultivated varieties of trees, shrubs and grasses. Outside of the existing town limits and within the eastern extent of the Planning Area, homesteads and small farms with irrigated hay fields or grassy rangelands spread out beyond the Town. For the most part, native grasses and other indigenous herbaceous plants have been replaced with hay and alfalfa fields. With the exception of scatted groupings of pine and fir trees, there are no real stands of native timber left within the Planning Area. Trees mainly consist of Cottonwoods and scattered fruit bearing trees (mainly apple, pear and plum trees) which are generally found along the edges of the creeks and man-made irrigation ditches where there is sufficient year- round moisture to sustain vibrant growth.

Wetlands within the Planning Area are generally found within the floodplain of the Bitterroot River and immediately adjacent to area creeks. These wetlands are generally confined to the edges of these streams or in isolated pockets were groundwater levels are at or near the surface. Substantial wetland areas along with highly valued waterfowl habitat are found mainly within the confines of The Lee Metcalf National Wildlife Refuge which is located just north of the Planning Area. This refuge contains a diverse combination of wetland types and forested river bottom habitat and is highly protected from any disturbances or perturbations by man.

3. Environmental Resources Present

3.1 Uniform Environmental Checklist:

As a prelude to the formulation of this PER, information on the environmental resources present in the Planning Area was collected, and anticipated impacts to the resources from the proposed projects were summarized in the *Uniform Environmental Checklist* (UEC). Included with the checklist was a narrative summary of the proposed project which is further detailed in this PER. This information was then submitted to local, regional, state and federal agencies for comments on the project. A copy of the checklist with the accompanying narrative and agency comments received are included in Appendix B. This information is used in part to determine if any environmental resources will be impacted by the project. Potential impacts along with any mitigation measures, where pertinent, are discussed in the following subsections with frequent reference to the UEC and the individual agency responses found in Appendix B.

3.2 Historical and Archeological Resources:

Saint Mary's mission, located at the end of 4th Street in the Town of Stevensville, was the first Catholic Mission in the northwest and the first permanent white settlement in Montana. The Mission was established in 1841 by Father Pierre DeSmet, who came to the Bitterroot Valley in response to requests for "Black Robes" by various Indian tribes of present-day Montana and Idaho. The mission complex includes the chapel/residence, Father Anthony Ravalli's log house and pharmacy, Chief Victor's cabin and the Indian burial plot. All buildings have been restored to the 1880 era and are furnished with items built by Father Ravalli, Montana's first medical doctor. Chief Victor's cabin is restored as an Indian museum. Nearby DeSmet Park was dedicated in 1991 to commemorate the 150th anniversary of the establishment of St. Mary's Mission.

Also included in the complex is The Stevensville Museum. This facility features the early growth and development of the Bitterroot Valley with displays of artifacts, pictures and information panels regarding the history of the American Indian population (the Salish Indians), the Lewis and Clark Corps of Discovery expedition through the valley in 1805-1806, the arrival of Father DeSmet in 1841, the establishment of the earliest mission in what is now Montana, the development of Fort Owen as one of the earliest trading posts and the history of Stevensville itself.

This historic Catholic Mission complex along with Fort Owen will not be impacted by the activities associated with the subject project. The response from the State's Historic Preservation Officer (SHPO) to the Environmental Checklist regarding this PER is included in Appendix B. It indicates a low likelihood of significant impact to both archaeological and historical resources for the proposed project due to the fact that virtually all actions will be conducted in previously disturbed areas.

3.3 Fish, Wildlife and Endangered Species:

During the preparation of the UEC, the database of the *Montana Natural Heritage Program* was checked for the presence of sensitive animal, fish or plant species within the Planning Area. No conflicts relative to the proposed project were noted.

The response received from the US Fish and Wildlife Service, USDI indicated that there are three (3) threatened species that may occur in the Planning Area, namely, the Canada Lynx, The Bull Trout and the Bald Eagle. In addition, the Gray Wolf, considered to be a nonessential experimental species introduced into the area, and the Yellow-billed Cuckoo, a candidate threatened species, may also occur in the area. The response indicated that, considering the nature, scope and location of the project, this agency does not anticipate adverse impacts to any federally listed threatened, endangered, candidate or proposed species or critical habitat.

3.4 Agricultural Land:

The Planning Area includes many agricultural parcels. The principal agriculture activities conducted within the Planning Area are the raising and pasturing of livestock, primarily cattle and horses, and hay cropping on irrigated lands. Eventually, the upgrade and expansion of the Town of Stevensville's water system will permit nearby agricultural lands to be developed as residential or commercial use. Overall, higher density development on lands provided with municipal level facilities will require less of the available land area and will ultimately serve to reduce impacts on agricultural lands throughout the general area.

The improvements proposed by this PER are primarily replacements or upgrades to existing facilities and do not directly impact agricultural lands or uses. However, the new transmission main route and the well field location on the south side of Middle Burnt Fork Road will result in the loss of approximately 4-6 acres of farmland/grazing land. The removal of this relatively small amount of land from agricultural use will have minimal impacts on agricultural activities in the area as sufficient useable fallow agricultural land is available to compensate for the minor loss.

3.5 Surface Waters, Floodplains and Wetlands:

The improvements proposed by this PER do not adversely impact any surface waters, floodplains or wetlands. All work will be conducted away from surface waters, outside of the 100-year flood zone and away from area wetlands. There is potential for one (1) stream crossing by a new water transmission main programmed as a part of this project. However, the stream is conveyed inside a culvert at the point of crossing and the line will be installed under the culvert thereby eliminating any impacts to the stream itself or to wetlands within the confines of the streambed.

Preliminary comments received from the Helena Regulatory Office of the US Army Corps of Engineers (USACE) indicated that they thought that the proposed new well site may be located in wetlands. Wetland delineation was completed for the Twin Creeks Well Site by PCI in March of 2008. The delineation concluded that the wetlands associated with Robertson Creek were jurisdictional wetlands and would require a USACE permit if disturbed. Ideally the new water transmission mains will be conveyed through the proposed Twin Creeks Subdivision and not disturb the wetlands on the north side of the well field.

3.6 Groundwater:

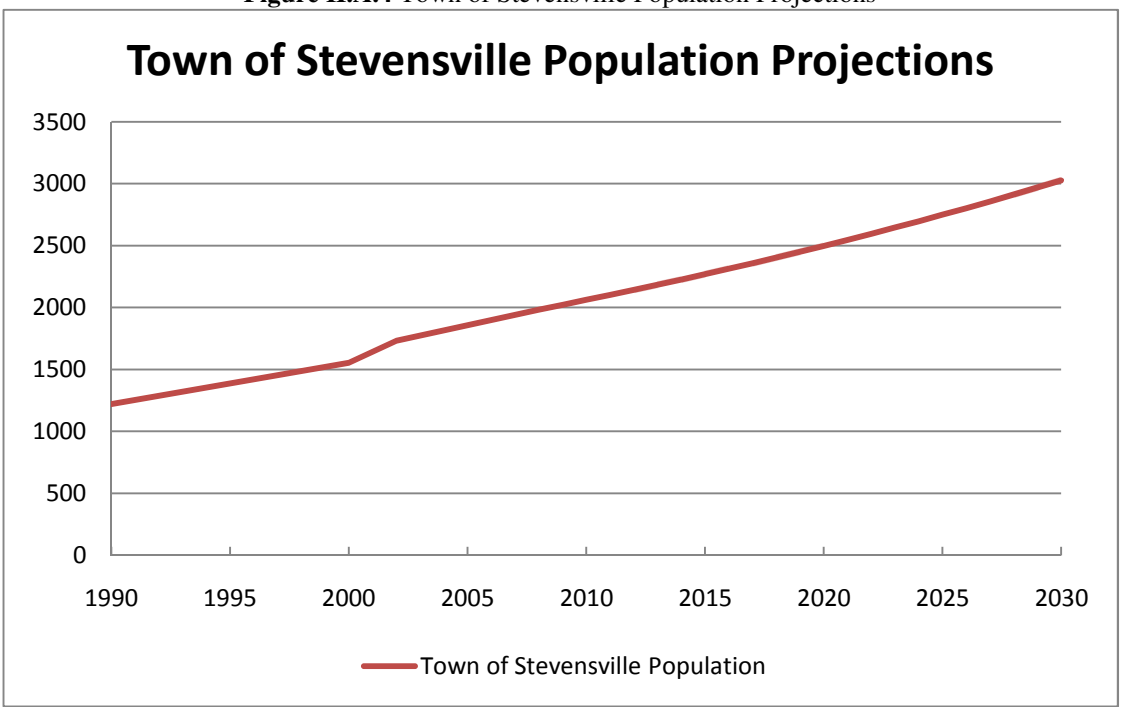
Groundwater under the Planning Area is known to be plentiful and generally of good quality. The near surface waters are seasonal and supported by summer irrigation of integral and surrounding pasture lands and hayfields.

Water quality testing of Stevensville's municipal drinking water supply both from the infiltration gallery and from the wells has not indicated any persistent or recurring water quality issues.

4. Growth Areas and Population Trends

According to U.S. Census Bureau statistics, the Town of Stevensville had an estimated population of 1,984 persons in 2008. The year 2000 census population was 1,553 and the year 1990 census population was 1,221. There was a 27.2 percent increase in population over the decade from 1990 to 2000 and a 3.5% annual increase from 2000 to 2008. By the same token, Ravalli County in general posted a 44.2 % growth rate over the decade from 1990 to 2000, for a 3.7% compounded annual growth rate. Projections by the Montana Department of Commerce project a 77.8% population increase for Ravalli County from the 2000 census to the year 2030, this works out to an average increase of 1.9% per year. The population growth in the Town is expected to mirror population growth throughout Ravalli County as a whole. The twenty-year growth projection for Stevensville is shown graphically in **Figure II.A.4**. Growth trends are such that future growth of the Town is expected to be primarily towards the east and south where there is available suitable land for development. Based on the above projections and current population estimates a population of 3,025 persons is forecast for the Planning year 2030.

Figure II.A.4 Town of Stevensville Population Projections



B. Evaluation of Existing Facilities.

1. Schematic Layout

As shown in Appendix C, the existing water system for the Town of Stevensville is generally bounded by the Middle Burnt Fork Road on the south; the Bitterroot River floodplain on the west; the Eastside Highway on the north; and Logan Road on the east. The water system presently serves a few connections outside the Town limits, along the Burnt Fork Road.

The existing water system includes the following components:

1) Supply from 3 groundwater wells
2) The Swamp / Mill Creek infiltration gallery (Appendix A)
3) Rapid sand filter for the infiltration gallery with chlorine disinfection
4) 435,000 gallon concrete storage reservoir
5) 10,000 feet each of 8" and 10" supply mains from reservoir to Town
6) 12.3 miles of 4", 6", 8" and 10"distribution piping
7) Corrosion control by ortho-phosphate fed at Well No.1 and treatment plant

2. History

The Town of Stevensville's water supply was constructed in 1909 with over 6.2 miles of 4", 6" and 8" wooden water pipe and a small concrete reservoir located between Mill Creek and North Swamp Creek. The Town appropriated 5 cubic feet per second (CFS) from North Swamp Creek that fall and the $20,035 construction cost was paid with a voted bond. Water rates were set in December, 1909 at $1.00 per residence and $1.50 for restaurants and saloons per month. Livery barns and hotels were charged $3.00. Although the wooden pipe is no longer in use, sections of the 8" main still remain under Middle Burnt Fork Road.

In the 1930's, an infiltration system was constructed that gathers shallow groundwater from below the surface of the fields between Mill and North Swamp Creeks. Initially, a total of 8,134 linear feet of drainage pipe was installed generally parallel to North Swamp Creek with the intent of capturing and routing subsurface flow down to the municipal reservoir. Three (3) concrete caisson collector wells were constructed approximately 1,200 to 1,500 feet upgradient of the reservoir. Collector Well #3 receives water from approximately 6,100 linear feet of drainage tile along North Swamp Creek. Collector Wells #2 & #3 are connected by approximately 200 linear feet and 425 linear feet of drainage tile to Collector Well #1.

A number of modifications and improvements have been made to this original system, including the addition of 443 linear feet of new drain pipe in 1974. This additional drain pipe is connected to Collector Well #3 and consists of a 14.5 foot deep trench filled with 8.5 feet of 3/4" washed gravel over a 10" perforated pipe oriented roughly perpendicular to Mill and North Swamp Creeks. The original 6,100 feet of drain tile was disconnected from the Collector Well #3 and was left to drain into the gravel filled trench. As the original drain pipe does not have any systematically applied surface water, the origin of flow in this part of the system is subsurface groundwater. While the 1974 drain improvement was also intended to capture groundwater, at present the principal source of water is from applied surface water infiltrating into the newer 443 linear feet of line connected directly to Collector Well #3.

Originally the raw water collected from the subsurface infiltration system was delivered to a large concrete storage tank at the water treatment plant site, and then piped to Town in an 8" wooden pipe. The wooden main was abandoned in about 1936 when the cast iron pipe was installed. The 8" cast iron pipe is generally on the north edge of Middle Burnt Fork Road and this pipe has "leaded hub" joints which fail on occasion and require excavation to repair. These joints are fairly "rigid" and ground movement from heavy traffic loads may cause them to separate and fail. In 2006 Hughes Supply performed a leak detection survey and found numerous leaks along the cast iron main near the railroad crossing on Middle Burnt Fork Road estimated at over 140,000 gallons/day. These repairs have not been completed since abandonment of the 8" line is proposed and was supposed to take place in early 2009. The Public Works staff reports only 4 to 5 repairs have been made to this line in the past 20 years, Therefore, many leaks are still present in this line. The Town is hesitant to repair the leaks in this line as they wish to abandon it as soon as possible. The large number of leaks in this main and the patching requirements of the

Ravalli County Road and Bridge Department on Middle Burnt Fork Road make temporary repair of this line very cost prohibitive.

In about 1977 a rapid-sand filter was constructed to treat the collected water from the infiltration system and a second transmission main was installed in Middle Burnt Fork Road. This pipe is a 10" PVC laid generally on the north edge of the right-of-way although it crosses to the south edge approximately 6,000 linear feet west of the water treatment plant and again to the north edge just west of the Montana Rail Link railroad tracks. In 1990 a 3-way valve was added to the Plant discharge to automatically dump the back-wash water to waste.

In addition to the water supply from the Mill and Swamp Creek infiltration system, the Town has 3 groundwater wells. Well No. 1 was drilled in 1957 and a 50 HP line-shaft turbine pump installed. Well No. 2 was drilled in 1968 and a 20HP submersible pump installed in 1998. Well No. 3 was drilled in 1976 and a 20HP submersible pump installed in 1991. The concrete storage tank is approximately 430,000± gallons and all the supply from the tank to the Town is via the 8" cast iron and 10" PVC pipelines.

3. Analysis of Existing Facilities

3.1 Current Water Demand:

An analysis of the present water demands requires a compilation of historical and past use from Town records. Because only 69% of the water services are metered, precise measurement of "sold" or used water is not available. In addition, not all of the Town's water supplies are metered. Water entering the system from the treatment plant is measured through a recording meter at the plant discharge. Well No. 1 has a totalizing turbine meter on the discharge pipe and both meters are read daily by Town staff. Wells No. 2 and 3 are not metered, but daily run-time records are kept by Town staff, and a flow rate is assumed. Current water use has been estimated using the metered data available for 2008 plus an estimated use for the flat rate customers. Flat rate water use was estimated at 125% of the metered average.

In order to reduce water demands to a common and comparable basis, the "equivalent dwelling unit" (EDU) will be used. An EDU may be considered as the typical water demand of a 3/4" size water service. Currently the Town differentiates between "residential" and "commercial" uses, metered or unmetered, and service size. Potential water use is only considered as being related to the size of the water service line or meter. For instance, in 2008 the "EDU's" are determined as below:

TABLE II.B.3.1.A: 2008 Inventory of Connections by Water Service Line Size

Meter Size	Number of Connections	Multiplier	EDU's
3/4 Inch	713	1	713
1 Inch	36	1.79	64.44
1-1/2 Inch	15	4	60
2 Inch	3	7.14	21.42
TOTALS	**708**		**858.86**

A summary of the annual water production from each of the Town's sources, and the EDU's served for the years 2006 through 2008 are shown in **Table II.B.3.1.B**. The Plant flows and Well No. 1 flows are taken from metered records. Flows from Well No. 2 and No. 3 are derived from the run-time records multiplied by the pump curve data of 190 gpm for Well No. 2 and 220 gpm for Well No. 3. Town staff reports the production from Wells No. 2 and 3 as 190 gpm average for purposes of annual water use inventory reports. An exact measurement of production from Wells No. 2 and 3 is not available due to a lack of metering. The number of EDU's for each year are based on the Town's water records and billing information.

TABLE II.B.3.1.B: 3 Year Annual Water Production

Year	Annual Production in Million Gallons					AADF (gpm)	Total EDU's	Average gpd/edu
	Plant	Well 1 270 gpm [1]	Well 2 190 gpm	Well 3 220 gpm	Total			
2006	163.65	40.5	14.23	49.8	268.18	510	793	927
2007	159.78	70.5	24.37	44.35	299	569	835	981
2008	135	93.32	30.35	36.44	295.11	561	859	941

[1] The impeller in Well No. 1 was adjusted in May 2005 and production increased from 150 gpm to 270 gpm.

Table II.B.3.1.C shows a detailed view of the 2008 water production records in order detail the water production on a monthly and daily peak basis.

TABLE II.B.3.1.C: Water Production in 2008

Month	days	Plant	gpm[1]	Well 1	Well 2	Well 3	Total	GPD/
				270 gpm	190 gpm	220 gpm	gallons	EDU
Jan	31	6,420,000	144	11,420,000	0	0	17,840,000	670
Feb	28	5,593,000	139	10,793,000	0	0	16,386,000	681
Mar	31	5,561,000	125	10,348,000	0	0	15,909,000	598
Apr	30	7,860,000	182	11,196,000	0	0	19,056,000	740
May	31	13,589,000	304	12,090,000	3,716,400	4,943,400	34,338,800	1290
Jun	30	11,937,000	276	10,856,000	3,522,600	9,504,000	35,819,600	1390
July *	31	19,587,000	439	13,042,000	8,481,600	9,820,800	50,931,400	1913
Aug	31	13,720,000	307	9,240,000	8,481,600	9,820,800	41,262,400	1550
Spt	30	16,595,000	384	2,084,000	6,144,600	2,349,600	27,173,200	1055
Oct	31	15,820,000	354	0	0	0	15,820,000	594
Nov	30	11,900,000	275	691,000	0	0	12,591,000	489
Dec	31	6,420,000	144	1,562,000	0	0	7,982,000	300
Total	365	135,002,000	257	93,322,000	30,346,800	36,438,600	295,109,400	941
Average Daily Flow							**808,519**	**GPD**

* The peak day recorded flow at the plant was in July was 831,000 gallons with all 3 wells operational; the peak day's total production was 1,953,400 gallons.

[1] Average gpm through the plant on a monthly basis. Daily records indicate a "peak day capacity" from the plant of 960 gpm.

Since all connections are not metered accurate water use data for Stevensville is not available. For the purpose of this report we will assume that once all connections are metered, the water usage for all users will be close to the average metered use. The 2008 metered water use consisted of 617.86 EDU's of the 858.86 total EDU's. The average water use from 2008 metered billing records was 274.95 gpd/Metered EDU. If this logic is applied to all EDU's, the average daily water use would be 236,140 gpd. Comparing this use to the water production records for 2008 results in 70.8% unaccounted for water. This number does not consider the fact that flat rate customers most likely use more water than metered users. Assuming flat rate customers use 25% more water than metered customers, lost water would still be 68.75% of production. This loss rate results in approximately 556,000 gpd of lost water. This amount of unaccounted for water is unacceptable and must be addressed by accurate metering and distribution system repairs and improvements. An estimate of water use and lost water is shown below

TABLE II.B.3.1.C2: Estimated water use and lost water

Year	**2006**	**2007**	**2008**
Population (Estimated)	1909	1946	1984
[1]Total Accounts (EDU)	793	835	859
[1]Ave Production GPD/EDU	926.53	981.05	941.23
[1]Annual Production (MG)	268.18	299	295.11
[1]Annual Metered Water Use (MG)	58.05	62.29	62.01
[1]Metered Accounts (EDU)	452	568	618
[2]Percentage Metered by EDU	57.00%	68.02%	71.94%
[2]Average Metered Use (GPD/EDU)	351.84	300.46	274.88
[3]Estimated Water Use (MG)	112.79	98.89	92.23
[4]Estimated Unaccounted for Water (MG)	155.39	200.11	202.88
Percentage Unaccounted for Water	57.94%	66.93%	68.75%

[1] From Town of Stevensville Records
[2] Calculated from Town records
[3] Estimate based on metered use plus unmetered connections estimated at 125% metered water use.
[4] Annual Production minus Estimated Water Use

Further confirmation of "lost" water can be deduced from measured wastewater treatment plant flows for the Town. Although there are a few water connections (out of Town) that are not connected to the wastewater plant, there are also a few sewer service connections that have their own water supply. The accounting for these users is not significant. **Table II.B.3.1.D** below summarizes the flows measured at the wastewater plant and compares to water system production records for 2008.

TABLE II.B.3.1.D, 2008 Average Daily Water Production and Wastewater Treatment Plant Flows by Month

Month	Water production (GPD)	Wastewater Plant Inflow (GPD)	Difference (GPD)
Jan	594,667	204,000	390,667
Feb	546,200	242,000	304,200
Mar	530,300	264,000	266,300
April	635,200	219,000	416,200
May	1,144,627	240,000	904,627
June	1,193,987	231,000	962,987
July	1,697,713	217,000	1,480,713
August	1,375,413	192,000	1,183,413
Sept	905,773	202,000	703,773
Oct	527,333	196,000	331,333
Nov	419,700	238,000	181,700
Dec	266,067	206,000	60,067
Average	819,748	220,917	598,832

The following observations and conclusions can be made from **Table II.B.3.1D**:

1. The wastewater plant flows are not adjusted for infiltration which is known to occur due to high groundwater. If adjustments are made for infiltration, the "lost" water would be even greater.
2. Winter time wastewater flows in February, March, and November exceed the annual average flows, most likely due to water users leaving fixtures open to prevent freezing. This is known by Town staff to occur.
3. A comparison of winter months wastewater inflow and water production confirm that a significant amount of produced water is "lost".
4. Average water production is approximately 941 gpd/EDU while average wastewater plant inflow is 257 gpd/EDU

Projections for future water use in Stevensville should be based on a significant reduction in "lost water". This reduction will occur over time and will most likely not resolve all leaks. Stevensville's billing records for "sold" water through metered services averaged 275 gpd/EDU in 2008, while "produced" water totaled 939 gpd/EDU a difference of 664 gpd/EDU. Water production for the Town of Stevensville is much higher than production in systems of similar size. The Town of Plains produced 425 gpd/EDU in 2004 on a base of 650 EDU's and the City of Hamilton reports 575 gpd/EDU in 2004 with 2,555 EDU's.

For maximum monthly and peak day demands, the calculations from the 2006 PER will be used. The records of the 2005 production year will be used to develop peaking factors for the community. For purposes of projecting water use demands, the 2005 production values will be adjusted to assume that 350,000 gpd in "lost" water is corrected. The following Table identifies the Peaking Factors for the existing flow conditions (2005 and estimates Peaking Factors for use in flow projections.

TABLE II.B.3.1.E
Peaking Factors for 2005 and adjustments for Projected Water Needs

	2005 actual		Corrected for " Lost Water"	
	Flow (gallons/day)	PF	Flow (gallons/day)	PF
Average Annual Daily Flow (AADF)	772,000	1.00	422,000	1.00
Maximum Month Flow (July)	1,499,952	1.94	1,149,952	2.73
Peak Daily Flow (July 14)	1,924,000	2.49	1,574,000	3.73

Projected Water Demand:
In order to project a water demand for 20 years in the future, we must predict the number of connections and population to be served in the year 2030. The graph of population projections shown in **Figure II.A.4** indicates that Stevensville can expect approximately 3,025 persons in 2030. If the growth rate of the water service connections is the same rate as the population growth rate, then there are 1,310 EDU's expected in 2030.

Based on the last leak detection survey completed in 2006, there are known leaks in the Middle Burnt Fork Road 8" cast iron main of approximately 140,000 gpd. This leak represents approximately 18% of the average daily production. In addition the Alliance for Water Efficiency states that unmetered water consumption is reduced 15% - 30% when metering and commodity rates are implemented. Based on the current metered use and the number of connections currently unmetered, a 2.3% reduction in daily production could be realized by metering all users. A reasonable approach to determining a required production quantity for the Town is to start with the current production rate and reduce the water demand with known improvements. Based on the above information, abandoning the 8" water main in Middle Burnt Fork Road (140,000 gpd) and moving to metering (25% reduction = 16,500 gpd) could be expected to reduce the overall water demand approximately 20%. This would reduce average day production to approximately 751 gpd/EDU as soon as these improvements are implemented.

Based on the large amount of unaccounted for water, it is assumed that there are a large number of leaks in the system that need to be repaired as they are found. We can expect that leaks will be found and repaired over time. If the Town of Stevensville is able to reduce "lost" water to approximately 15% of production by 2030, the water demand will be as follows:

Table II.B.3.1.F

Projected Water Demands

Year / Parameter	**2008** [1]	**2010**	**2015**	**2020**	**2025**	**2030** [2]
Estimated Population	1984	2155	2379	2498	2900	3025
EDU's	859	893	982	1081	1190	1310
Average Production (gpd/EDU)	941	750	650	600	550	500
Annual Production (MG)	295.11	244.46	232.98	236.74	238.89	239.08
Average Annual Daily Flow (AADF) MG	0.81	0.67	0.64	0.65	0.65	0.66
AADF (gpm)	561	465	443	450	455	455
Max. month (2.73 x AADFx31)MG	68.43	56.68	54.02	54.89	55.39	55.43
Peak Day (3.73 AADF) MG	3.02	2.50	2.38	2.42	2.44	2.44
Required Supply (gpm)	2094	1735	1653	1680	1695	1697

[1] These values are actual measured production figures for the year 2008.
[2] Expected water production if "lost water" is reduced to 15% of production by 2030.

In addition to the domestic demands on the water system as identified above, the water system must serve the fire protection needs of Stevensville. The Hydrant Flow Data Summary produced by the ISO Commercial Risk Services in 1996 (a copy is included in Appendix C), indicates a desired fire flow in the downtown commercial areas as high as 3,500 gpm and 3,000 gpm at the school. Based on the water model, in its current state the water system is only capable of delivering 1,000 gpm or more to 6 of 118 intersections in Town under peak day conditions (See fire flow data in Appendix C). Improvements to supply, distribution and storage will be needed to meet ISO fire flow demands. The domestic demands and fire flow rate must be met from a combination of supply and storage.

3.2 Adequacy of Supply:

Stevensville presently relies upon its infiltration gallery with treatment plant and three (3) groundwater wells for water supply. A summary of those supplies is presented in **Table II.B.3.2.** The total current available supply from all three (3) wells and the treatment plant is 1580 gpm peak capacity. The supply does not currently meet the peak requirements of the Town of Stevensville. It should be noted that there is presently no back-up power available for the water supplies. Should power completely fail, the storage tank maintains about a 12 hour supply at AADF. Water rights abstracts can be found in Appendix F.

Table II.B.3.2:
Existing Well & Infiltration System Production and Water Right Summary

Water Source	Peak Flows 2008 (gpm)	Volume Recorded 2008 (Acre-feet)	Water Right Number	Water Right Type	Source	Permitted Flow (gpm)	Claimed Volume Acre-feet	Period of Use
Infiltration Gallery / Treatment Plant	900	414.31	214147	Claim / decreed	Mill Creek	1122	1120	1/1 - 12/31
			214149	Claim / decreed	Mill Creek	561	900	1/1 - 12/31
			76H 76760 00	Provisional permit	N Swamp Creek	337.5	272.2	10/15-4/15
			76H 88532 00	Provisional Permit	groundwater	345.3	556.97	1/1-12/31
Well No. 1	270 [1)]	286.39	76H 89376 00	Provisional Permit	groundwater	500	919.86	1/1 - 12/31
Well No. 2	190	93.13	76H 7286 00	Provisional Permit	groundwater	240	40	1/1 - 12/31
Well No. 3	220	96.58	76H 9186 00	Provisional Permit	groundwater	220	340	1/1 - 12/31
Total	1580	890.41				3325.8	4149.03	

[1] The impeller for Well No. 1 was adjusted in May, 2005 and the capacity increased from 150 gpm to 270 gpm.

Surface Water / Treatment Plant Supply:
As summarized in **Table II.B.3.2**, the source water collected by the infiltration gallery and brought into the treatment plant is from three (3) basic sources: 1) groundwater through an infiltration gallery; 2) Mill Creek water which is applied to the surface and percolates to the infiltration gallery; and 3) direct withdrawal from North Swamp Creek. While the total water claimed or permitted from these sources is more than sufficient to meet the demands of the Town, the practical acquisition of this quantity is much more problematic. The Mill Creek and Swamp Creek sources are a part of the Burnt Fork drainage which is the earliest appropriated drainage in Montana and perhaps has some of the most contested claims for water. While the Bitterroot Basin 76H is closed to further appropriations of surface water, the closure does not apply to municipal water supplies [MCA 85.2.344(2)(b)]. Even so, the Town staff does not feel that it is likely that any additional water could be collected for the treatment plant than is currently appropriated. Seasonal average daily flows from plant have been 150 to 650 gpm with peaks to over 900 gpm. It is not anticipated that this flow rate can be increased. The design flow from the treatment plant is 784 gpm, as described in the *"Water Treatment Plant Preliminary Engineering Report" by* Welch Comer, This report is available from the Town of Stevensville upon request.

Groundwater Well Supply:
The Town's three (3) groundwater supply wells are very dated and in fair to poor condition. Well 1 was completed in 1957, Well 2 was constructed in 1968 and Well 3 was completed in 1976. Each well pumps separately and directly into the distribution grid. Wells 2 and 3 are located in street right-of-ways or limited easements with insufficient area for proper controls or improvements. A copy of available and Groundwater Information Center (GWIC) information on each well is included in Appendix C. A summary of each well follows:

Well No.1 is located near the intersection of Main Street and Eastside Highway on the north side of Town, within a small city park. The well has a 10" steel casing drilled to a depth of 460 feet BLS with perforations at 362 to 370 feet. It appears that a screen was pulled and the well was perforated in 1957. In May, 2005, the City contracted to have the pump impellers adjusted and the production rate was improved to approximately 400 gpm. However, production was limited to 270 gpm due to excessive sand production at flows above 270 gpm. (Approximately 400lbs per day of sand was generated during test pumping) Recently the Town has been receiving sand complaints near Well 1 and this well is assumed to be at the end of its useful life.

Well No. 2 is located at the northeast intersection of South Avenue and Mission Street in the southern portion of the Town. The location is within the edge of the street right-of-way and the wellhead is located below the ground surface in a pit. The well has an 8" steel casing drilled to a depth of 56 feet BLS. The casing is perforated in the 36' to 56' range. There is no screen. It has a 20 hp submersible pump set at a depth of 47 feet. The pump installer indicated the pump was producing 190 gpm at 100 psi when installed. The well is un-metered, but the claimed rate is consistent with the supplied pump characteristics. The Department of Environmental Quality has expressed concerns about this well including pump control and vent locations to the pump being set below the perforations in the casing.

Well No. 3 is located adjacent to the Maplewood Cemetery in the southwest portion of the Town. The well has an 8" steel casing drilled to a depth of 75 feet BLS. The casing is perforated in the 40' to 75' range. There is no screen. It has a 20 hp submersible pump set at a depth of 61 feet. The pump is rated at 220 gpm according to the installer. The Department of Environmental Quality has expressed similar concerns with this well as to Well No. 2.

The maximum historical daily production with all wells in operation plus the treatment plant was experienced on July 4, 2003. The recorded flow was 2.19 MGD or 1,518 gpm. However, the tank at the treatment plant was almost drained dry on that day in order to supply the demand on the distribution system.

The adequacy of the water supply is typically judged on the capacity to meet the peak day demand with the largest producer out of service per DEQ Circular 1, Section 3.2.1.1.a. For Stevensville, the largest producer is the treatment plant at 900 gpm. The adequacy of Stevensville's existing water supply to meet the demands over the next 20 years is shown below:

Table II.B.3.2.A, Existing Water Supply vs. Future Demand with Largest Source Out of Service
(*) 2009-2030 Flows based on significant reduction in lost water to achieve 15% lost water by 2030

	Average Day (gpm)			Peak Day Conditions (gpm)		
Year	Demand	Supply (1)	Shortage	Demand	Supply (1)	Shortage
2008	552	680	-	2059	680	1379
2009	456	680	-	1701	680	1021
2010	465	680	-	1734	680	1054
2011	474	680	-	1768	680	1088
2012	483	680	-	1802	680	1122
2013	492	680	-	1837	680	1157
2014	502	680	-	1872	680	1192
2015	443	680	-	1654	680	974
2016	452	680	-	1686	680	1006
2017	461	680	-	1719	680	1039
2018	470	680	-	1752	680	1072
2019	479	680	-	1786	680	1106
2020	451	680	-	1681	680	1001
2021	459	680	-	1713	680	1033
2022	468	680	-	1746	680	1066
2023	477	680	-	1780	680	1100
2024	487	680	-	1815	680	1135
2025	455	680	-	1696	680	1016
2026	463	680	-	1729	680	1049
2027	472	680	-	1762	680	1082
2028	482	680	-	1796	680	1116
2029	491	680	-	1831	680	1151
2030	455	680	-	1697	680	1017

[1] Based on capacity with largest supply (treatment plant) out of service.

It should be noted that the infiltration gallery peak supply (900 gpm) is likely the most susceptible to short-term drought conditions (shortage of irrigation water) which will be co-incident with peak summer demands. The infiltration gallery is also subject to frequent rejection

of water during peak runoff in the spring and after rain events when filtered water exceeds allowable turbidity standards.

The above table shows that the Town's existing sources are not adequate to meet current peak demands of the system due to excessive leakage, and cannot meet future demands even with leak reduction. Combined with the fact that the Town's storage is also below the requirements outlined in DEQ Circular 1, Section 7.0.1. this places the Town at risk of running out of water during peak use events. It also shows that even if the Town repairs/replaces its leaking transmission mains the existing source is not able to keep up with peak flow demands over the next 20 years.

In addition, the lack of automated controls is greatly hampering the efficiency of the water supply system. At this time, all wells are manually controlled. Wells are turned on by staff at times they feel or note that the treatment plant supplies will not keep up with demands, and wells often run when the plant could keep up with demand. Any modifications to the water supply should include telemetry and controls to automate the system and provide alarms for low and high water conditions.

3.3 Source Water Protection Plan:

A Source Water Protection Plan (SWPP) for Stevensville was completed by Western Groundwater Services of Bozeman, MT in the year 2000 and subsequently adopted by the Town and accepted by the Department of Environmental Quality. This Plan identified the sensitivity of the well and near surface water sources to contamination and inventoried potential contamination sources in the vicinity of each raw water source point. The Plan identified Wells 2 and 3 and the infiltration gallery source as having a "High" sensitivity classification. Well No. 1 was classified as having a "moderate" level of sensitivity to contamination due to its depth and the fact that it draws its water from a semi-confined aquifer. The Plan reviews emergency procedures including source isolation in the event of contamination and details alternative raw water sources for the Town.

Chapter 5 of the Plan recommends alternative sources of supply as being groundwater wells located south east of Town along the Burnt Fork Road. Applicable portions of the Source Water Protection Plan are included in Appendix D. Other well locations have also been explored by the Town and are described in more detail in the Alternatives Analysis Section of this PER.

3.4 Treatment:

Treatment facilities for the Town's supplies include chlorination and ortho-phosphate feed at the treatment plant for the surface water collection system, and ortho-phosphate feed at Well No. 1 as a corrosion control measure to mitigate copper leaching. Chlorination is currently approved for Well No. 1 and being added.

Appendix C includes a schematic diagram of the existing water treatment plant which is located at the southwest corner of Middle Burnt Fork and South Burnt Fork Roads. The treatment plant

was designed in 1978 and was constructed in 1979. The plant was designed for a maximum daily flow of 784 gpm. Modifications since that time have included chlorine residual sampling, turbidity sampling, and a backwash wastewater bypass. Refer to the "*Water Treatment Plant Preliminary Engineering Report*" by Welch-Comer & Associates for more detailed information on the Treatment Plant.

At this time, only the treatment plant discharge is being chlorinated before it is introduced into the distribution system. The Well supplies are not chlorinated and it will not be feasible to add chlorination to Well No. 2 & 3 due to lack of available space. The EPA's Groundwater Treatment Rule requires chlorination of groundwater sources in a manner to provide contact time prior to the first user of the water if required by source water monitoring. As configured, none of Stevensville's wells will be able to meet this condition. Space is not available at any of the well sites to allow storage or piping sufficient to provide contact time for 4-log disinfection if required by the Groundwater Rule.

The Town's water supply has been shown to be corrosive towards lead and copper with recurring violations of copper exceeding regulatory limits. In 2001 the City prepared and adopted a MDEQ approved corrosion control plan and began feeding ortho-phosphate into the supply at the Treatment Plant and at Well No. 1 during the fall of 2001. Lead and copper samples taken since indicate that the program is successful and the Town will continue and expand the ortho-phosphate corrosion control measures.

Preliminary testing of the Town's groundwater and surface water supplies have indicated there should be no issues with radio-nuclides. Likewise, preliminary testing for disinfection byproducts (DBP) appears to be satisfactory. Arsenic concentrations are below the current and proposed MCL's. The proposed radon standard, if adopted, will most likely mean that Stevensville will have to aerate, or otherwise treat, its supplies. Since the current groundwater well sites are limited and lack sufficient area future wells or "well fields" must consider adequate space for future treatment needs of the groundwater supply.

3.5 Storage:

The Town's only water storage facility is located at the treatment plant. The nominal 430,000± gallon concrete tank is 110 feet in diameter with a total water depth of 6 feet. In order to maintain an adequate contact time for chlorine through the tank, MDEQ has defined the minimum operating volume of the reservoir at 295,000 gallons and allowed a "baffling factor" of 0.2. The resulting contact time is adequate to provide 4-log disinfection for viruses at a flow of 900 gpm at a chlorine concentration of 0.5 mg/L without counting the transport time in the transmission main.

The tank was cleaned and video inspected in November, 2004, by *Liquivision Technology* of Klamath Falls, OR. The complete report and photos are available from the Town of Stevensville upon request. After cleaning a significant amount of sand and silt, the tank was found to be in

good condition. One (1) seam on the tank bottom was found and leak tested as satisfactory. A video of the tank inspection is available at Town Hall.

DEQ Circular 1 states that the minimum storage must accommodate domestic water needs for the 24 hour average day, and fire flow demands as recommended by the State Fire Code and the Insurance Service Office (ISO). The most recent ISO rating and Hydrant Flow Data Summary (1996) is included in Appendix C and the "needed fire flow" (NFF) ranges from 1000 gpm in the residential areas to 3500 gpm in the downtown commercial district. The ISO recommends a 2 hour duration for fires of less than 3,000 gpm and a 3 hour minimum duration for greater than 3,000 gpm. The fire flow is in addition to supplies available for the 24 hour average flow. Since no major changes to the water system have occurred since 1996 it is assumed that these requirements are still valid.

The following **TABLE II.B.3.5A** summarizes the total storage volume recommended for existing system demands (2008) and the projected demands of 2030.

TABLE II.B.3.5A System Storage Requirements

	2008 conditions		2030 Projected	
System Average Day (gpm)	561	561	455	455
System Peak Day (gpm(	2,094	2,094	1,697	1,697
Required Fire Flow (NFF)	1,000	3,500	1,000	3,500
Total Flow required (gpm)	3,094	5,594	2,697	5,197
Less available supply (gpm)	1,580	1,580	2,262	2,262
Net rate from storage (gpm)	1,514	4,014	435	2,935
Fire Storage Volume Required (gal)	181,680	722,520	52,200	528,300
24-hour Average Day	807,840	807,840	655,200	655,200
TOTAL RECOMMENDED VOLUME (gal)	989,520	1,530,360	707,400	1,183,500

The Table above shows that the existing storage reservoir (435,000 gallons) is insufficient for both existing and future needs. However, it should also be noted that the system leaks also drastically affect the sizing of the storage tank. Without accurate metered use records, and assumed production numbers, it is difficult to accurately size the storage tank, and may result in an oversized storage tank which could pose water quality issues as the leaks are reduced and more accurate metering data becomes available.

Based on discussions with Rural Development and TSEP, it would not be in the Towns best interest to size and design a water tank at this time. Due to the fact that the Town of Stevensville is currently unmetered, and that there is a large amount of leaks in the distribution system, sizing a tank based on estimated usage and leaks would result in an oversized tank. Over sizing of the tank could lead to water quality issues such as stagnation, and would add additional cost to an already expensive project. A detailed water use and fire flow analysis will be performed after

the Town's leaks have been reduced through the proposed distribution improvements and there is at least one year of metered use records for the Town. From this information a more accurate and cost effective tanks sizing will be able to be performed.

3.6 Distribution System:

The water distribution piping system consists of mains ranging in size from 2" to 10" in diameter and made of galvanized iron, cast iron, steel and PVC. The Town has employed leak detection services to inventory the water mains and the most recent in March of 2006, uncovered five (5) leaks with an estimated leakage rate of 217,080 gpd of which over 140,000 gpd was found in the 8" cast iron main in Middle Burnt Fork Road (see Appendix A). This accounts for almost 30% of the "lost" water indicated by the production records and wastewater treatment plant measured inflows. The cast iron main in Middle Burnt Fork Road is assumed to be the main source of water loss for the Town.

It has been the Town maintenance staff's experience that leakage in Town may be predominantly in service lines and their connections to the mains. Copper "loops" as flex joint connections to the main were common and corrosion of the copper is reported frequently. Due to porous gravel soils, leaks are generally undetected until they get severe enough to cause noise in the serviced, or adjoining, homes. These leaks are fixed by the Town's staff as they are found.

Piping replacements and improvements should be made to improve fire flows to ISO standards and loop dead-end mains for improved water quality and dependability.

3.7 Utilization of Water Meters:

On the supply side, only the treatment plant and Well No. 1 have metered discharges. Flow from wells No. 2 and 3 are estimated based on pump curve data and run time. On the distribution side, approximately 68% of the services connected to the Town are metered. Due to the lack of complete metering of "produced" and "sold" water, there can be no accurate accounting for "lost" water. Based on the 2008 reported production rates and sewer flows during the winter months, it is estimated that over 500,000 gallon per day of produced water is lost through leaks in the distribution system; this represents over 68% of the produced water on an annual average. Metering of all supplies and of all water service lines is expected to have a significant impact on water conservation.

For the past several years, all new connections to the water system have required meters. In addition, Town ordinances require installation of meters when a house is sold or transferred. The Town recognizes the benefit of installing meters on the remaining 250 unmetered connections, and intends to establish a metering program as part of the improvement project. Most grant funding programs require metering of all customers as a funding condition.

3.8 Operational and management practices and capabilities:

At present two (2) persons at the supervisory level share the Public Works duties within the Town. Daily operation of the water system is handled by one of these supervisors, with the assistance of 2 field personnel and the water & sewer billing clerk.

Although the system has been historically reliable and is relatively simple and easy to operate, the aged condition of the supply and distribution elements, together with pending regulatory requirements, mean that replacement and upgrades are urgently needed. The lack of an automated control system means that all well functions are done by hand at times dictated by operator knowledge, and wells often run when not needed. A lack of meters on all supplies and 31% of services make monitoring of water use and production impossible. The water system operators have expressed interest in minimizing technology and complicated controls in any new system, but installation of automated controls will greatly improve efficiency and conserve water and power.

4. Financial Status of Facilities -

Water Rates:

The Town of Stevensville has experienced growth in the water system consistent with the rapid population growth of the community. However, there have been few changes, improvements or upgrades to the system for over 25 years. As a result, there has been no debt service obligation for the water system users in about 10 years, but the water system infrastructure is aging and in several instances, beyond its useful life.

The Town's present water rate system includes both a flat rate for unmetered customers and a metered rate for those customers whose water usage is metered. The water rate includes a "base rate" according to the user's water service size. Metered connections enjoy a lower "base rate" but sustain a charge for water use over 10,000 gallons per quarter.

The Town's current water rates are billed quarterly based as follows:

¾" Flat Rates:	$51.31/quarter + $32.90 annual irrigation
¾" Metered Rates:	$43.96 + $0.55/1000 gal over 10,000 gallons/quarter

In addition, each water account is charged the $2.00 annual DEQ water fee.

The typical residential monthly water rates are shown in the following table for flat rate and metered rate customers, based on a 3/4" meter and the average annual water use per EDU. The average annual water use is estimated from the 2008 billing records for metered customers at 100,375 gal/EDU/year.

TABLE II.4.1.A Current Estimated typical monthly water bill (1 EDU)

	Annual fees				
Account type	base rate	irrigation	MDEQ fee	usage[1]	monthly cost
Flat rate 3/4" Service	$205.24	$32.90	$2.00	N/A	$20.01
3/4 Metered Service	$175.84		$2.00	$33.21	$17.59

[1] Usage is based on the 2008 metered average of 100,375 gal/year/EDU less 10,000 gal/quarter base allocation.

Sewer Rates:
Sewer rates are based on water service line sizes and the EDU system. The current sewer rate was adopted in July, 2004, and may be summarized:

TABLE II.4.2.A Sewer Rates

Water meter size	EDU factor	Annual cost	Quarterly cost	Monthly cost
3/4"	1	$ 421.08	$ 105.27	$ 35.09
1"	1.79	$ 753.72	$ 188.43	$ 62.81
1 1/2"	4	$ 1,684.32	$ 421.08	$ 140.36
2"	7.14	$ 3,006.48	$ 751.63	$ 250.54

Infrastructure Access Fee (IAF):
In addition to the water and sewer fees above, the Town adopted an "Infrastructure Access Fee" in 1996 that is in addition to connection charges and other service charges and is assessed to any new developments to help defray the cost of excess water and sewer system capacity. The charge represents the proportionate capacity of the 'general benefit' facilities required by the new development, and revenues collected from the IAFs are used to retire any debt encountered in constructing the general benefit facilities, or in contributions to the system capital improvement fund. Because the sewer system had been funded in part with GO bonds spread over different portions of the Town, the IAF is variable depending on the location of the new construction. The water portion is a constant $2,400 (3/4" service) and the sewer ranges from $365 to $1,000 (per 3/4" water service) depending on the location of the new construction. The calculation of the IAF has not been updated since its inception in 1996 and the Town is encouraged to do so.

The Water and Sewer rate Schedules and the Ordinance establishing the IAF are included in Appendix E.

The following Table illustrates the Water Fund condition for the past 3 years and the projected Budget for the 2009 - 2010 fiscal year.

WATER FUND [1]				
	Actual			Budgeted
Item	**FY 06-07**	**FY 07-08**	**FY 08-09**	**FY 09-10**
Total Accounts (2)	739	745	767	787
EDU's	792.65	834.65	858.86	881
O & M Expense	$216,070	$199,127	$309,394	$271,395
Debt Service	$0	$0	$0	$0
Total water operation expense	**$216,070**	**$199,127**	**$309,394**	**$271,395**
Total Water Sales (3)	$164,225	$207,632	$233,041	$228,380
Other revenue (4)	$24,539	$10,970	$2,017	$2,017
Infrastructure Access Fees	$32,952	$3,415	$0	$0
Investment earnings (5)	$9,097	$5,114	$0	$0
Grants	$40,690	$0	$0	$0
Total Water Revenues	**$271,503**	**$227,131**	**$235,058**	**$230,397**
Net Revenue Surplus/Shortfall	$55,433	$28,004	($74,336)	($40,998)
% Surplus/Shortfall	26%	14%	-24%	-15%

Notes:
(1) Combines the revenues and expenses from both the Water Fund and the Water Replacement Funds as kept by the Town.
(2) Total Water Service accounts billed
(3) This is the revenue actually received and not the amount billed.
(4) Sources for these revenues include materials sold such as piping, valves, fittings, backflow preventers, etc.
(5) From CDs on deposit at local banks.

From inspection of the actual water revenues vs. expenses for the past 3 years, it is apparent that water charges are not keeping up with the operating expenses. Note that there is no debt service in place at this time.

HDR has evaluated the Town's water and sewer rates and prepared a rate study to help the Town properly budget for proposed improvements, as well as building up a operating reserve, debt reserve, capital reserve and rate stabilization reserve. These revenue requirements were presented to Town Council on October 26, 2009 and cover through the year 2014, at which point they should be reevaluated. A copy of the Revenue Requirements Presentation is included in Appendix E.

C. Description and Documentation of the Need for the Project

1. Health and Safety -

1.1 Treatment:

The treatment plant, located on Middle Burnt Fork Road southeast of the Town, was constructed in 1978 with a design capacity of 933,000 gpd. Due to the fact that there is no raw water turbidity meter in the plant, and that the plant is often unable to meet the turbidity requirements of EPA's Long Term 1 Enhanced Surface Water Treatment Rule, which had a January 14, 2005 deadline for compliance. The Town is currently out of compliance with this rule. However, the filtration plant is equipped with a bypass valve which discharges water to waste that does not meet the turbidity requirements; therefore, there have been no turbidity violations at the plant. Although this method protects the health and safety of the residents in Town, it also takes the treatment plant out of production during spring runoff and after large rain events. This rule is designed to insure that municipal water systems reduce disease incidence associated with *Cryptosporidium*, a protozoan parasite present in surface waters, and other pathogenic microorganisms. See the *"Water Treatment Plant Report"* by Welch-Comer for a complete discussion.

The current 9-ft x 40.67-ft rapid sand filter consists of 6-inches of filter media on 6-inches of support gravel, and does not meet the following design requirements established in DEQ Circular 1, Section 4.2. Section 4.2.1.3 requires a minimum of two (2) filters be provided, with each capable of meeting the projected maximum daily demand. Section 4.2.1.4 requires a minimum filter box depth of 8-1/2 feet (currently 7.66-ft). Section 4.2.1.6 requires a total filter media depth of not less than 24 inches and generally not more than 30 inches.

1.2 Transmission:

There are 2 existing water supply lines from the storage tank to Town. An 8" cast iron line with leaded hubs was installed in the right-of-way of Middle Burnt Fork Road in the 1930's. Leaded hub joint pipe is always a concern for lead leaching, however, testing for lead and copper during 1993, 1994 and 2001 only indicated 1 recordable level of lead (0.008 mg/l) and the regulatory limit is twice that reading at 0.015 mg/l. A leak detection survey in the Spring of 2006 found approximately 12 leaking hubs (joints) in a 3000 foot stretch of the 8" main totaling over 140,000 gpd. These leaks have yet to be repaired since it is the Town's preference to abandon/replace this main, and considerable cost would be associated with the repair. Additional leaks can be expected with time and traffic on the roadway if this main is kept in service as the 8" main is far past its useful life (50 years maximum). A 10" PVC line was constructed in 1978 which parallels the 8" main to town. This 10" line is not capable of delivering peak demands to the Town's distribution system on its own. However, if additional source capacity is developed in Town this main is capable of delivering up to 2400 gpm without exceeding the 10 ft/sec velocity as recommended by AWWA.

The Ravalli County Road and Bridge Department reports that they endure recurring failures in the road subgrade on Middle Burnt Fork Road due to periodic collapse of the old wooden water main and transport of groundwater via the wooden conduit. Installation of a new transmission main should co-incidentally replace the wooden line or insure it is properly abandoned.

As can be seen in **TABLE II.B.3.5A**, required flows during a fire event will be 2,700 to 5,200 gpm if both fire and domestic flows are delivered in the transmission main during peak day usage. It is recommended that the leaking 8" cast iron main be replaced or abandoned in-place. Adequate transmission mains should be installed to deliver ISO required fire flows and peak day domestic demands from the new source to Town. Replacement of the 10" main to the existing storage tank does not appear to be necessary if a consolidated well field is developed in or near Town and water from this source can be delivered to Town.

1.3 Storage:
The present Town storage is a concrete tank of 430,000 gallons constructed in the late 1950's or early 1960's with an open top. In 1979 a sealed concrete lid was added. The tank was cleaned and inspected in 2004 and found to be generally in good condition. The tank has no baffling and the "baffling factor" has been determined by DEQ as 0.2 based on a peak flow of 900 gpm. The tank is sufficiently sized to provide 4-log chlorination at a free chlorine residual of 0.5 mg/L.

TABLE II.B.3.5A indicates that additional storage is needed to meet DEQ and ISO requirements currently and for the 20 year projected growth. However, due to the fact that accurate metering information is unavailable, tank sizing should be delayed until water use and loss can be accurately assessed.

1.4 Supply:
In 2003, the Town was not able to keep up with demands during the peak summer months. Only severe watering restrictions prevented the storage tank from running empty. After realizing that Well No. 1 was producing only about 25% of it's original capacity, the Town had the impellers adjusted in May, 2005, and recovered an additional 120 gpm.

However, review of production records from the Town's existing supplies for the past 3 years indicate that the production from the system supplies is more than twice what should be expected (annual averages of 900 to 1000 gpd/edu). The present production capability does not meet the requirements of DEQ Circular 1, Section 3.2.1.1.a. for peak day flow, and becomes worse over the 20 year design period.

The Source Water Protection Plan, approved and adopted in 2000, identified Wells 2 & 3 as highly susceptible to point source contamination. These wells are in the shallow aquifer with no surface seals and have no easement or land area for protection, installation of back-up power, or disinfection equipment. These wells should be phased out of service.

Well No. 1 was deepened in 1957 and a line-shaft turbine was installed. In May, 2005, the City contracted to have the pump impellers adjusted and the production rate was improved to approximately 400 gpm. However, production was limited to 270 gpm due to excessive sand production at flows above 270 gpm. Recently the Town has been receiving sand complaints near Well 1 and this well is assumed to be at the end of its useful life. Due to its age (near 50 years), condition (50% efficient), and the fact that it pumps directly into the distribution system, replacement of this well should be considered. If this well is to continue in service, a new pump, pumphouse, piping, and control system should also be considered. The Well is in a small city park and lacks adequate space to provide adequate contact time should disinfection become a requirement.

A well field along the Burnt Fork Road corridor was suggested in the Source Water Protection Plan (2000). The Twin Creeks Subdivision located in this area has agreed to provide 4-6 acres for a municipal well field. A test well was drilled in May 2007 and a *PWS-6 Source Water Protection Delineation* was prepared by Geomatrix Consultants, Inc. in November 2007. This test determined that there was adequate high quality water available for a consolidated well field. In April of 2008 a 10" diameter production well was drilled on the proposed well field property, and in August 2008 AMEC Geomatrix, Inc. prepared a *Hydrogeologic Assessment Report and Criteria Addendum Evaluation in Support of Application for Beneficial Use Permit*. A 72-hour pump test was performed to test the well capacity and establish the capacity of the aquifer. The test demonstrated that a capacity of 1,100 gpm was physically available from the production well.

An automatic control system is needed on the wells to bring them on and off based on tank water level. Such controls will save on pumping costs and conserve water as well as provide a reliable water supply under all flow scenarios, including fire flow conditions.

1.5 Distribution:

An ISO study and report in 1996 requested a goal of 3000 gpm at the School, 3500 gpm in the downtown area and 1000 gpm in most residential areas to assure fire protection. The current system of 4", 6", 8" and 10" piping cannot meet these requirements in most locations (see Appendix C). In addition, a review of water production records indicates that the system has over 60% lost water on average, most likely due to leakage. However, since the water system is not completely metered an accurate accounting of lost water cannot be made.

Dead-end lines should be completed as a looped system for assured water quality, disinfection, and service redundancy. Leaking water mains and services are a potential source of chlorine and ortho-phosphate contamination to the high groundwater levels prevalent in the Stevensville area. High groundwater levels are supported by summertime flood irrigation throughout the area. The coarse gravel alluviums provide a direct link of leaking water mains to the Bitterroot River. Leaking mains and services also provide a potential mechanism for bacteriological contamination from known leaking sewer mains and from the prevalence of on-site septic systems in the rapidly developing areas east and south of the Town. It is estimated that 600

pounds of phosphates and 200 pounds of chlorine are added annually to local groundwater due to leaking pipe systems.

It is the experience of the Town maintenance staff that most of the leakage excluding Middle Burnt Fork Road originates from copper service lines which are corroding at the corp. stop. The copper either corrodes through or breaks off at the connection. Once the leak is severe enough, a pressure drop at the house or the noise level of the moving water is noticed by occupants of the home. The last leak detection survey was completed in March, 2006. This survey identified several leaks in mains and services in town and found significant leakage in the 8" cast iron main in Middle Burnt Fork Road. Continuing leak detection and repair are necessary maintenance items and are expected to continue.

Additional water mains and water main replacement are required to complete the system grid and improve peak and fire flow capacities as well as to improve water quality. Water main and service line replacements are needed to reduce lost water to an acceptable level, reduce production and chemical costs and prevent groundwater pollution. The water distribution improvements shown in Appendix C will bring the present system into ISO compliance and provide service for the Planning period.

1.6 Metering:

Approximately 31% of the water system users are un-metered and currently pay a flat rate for water service. Metering of all services will help reduce "lost water" and also makes sense from a fiscal and water conservation standpoint. Most grant funding programs will require metering of all customers as a funding condition.

The Town needs to install water meters on the remaining 248 un-metered customers in order to meet loan and/or grant funding conditions and to better inventory water uses and losses due to leakage. With all customers metered, the Town will be better equipped to collect fair and adequate revenues from all connected users, and will be able to more accurately determine water use for storage tank sizing.

2. System O&M –

In general the Stevensville water system has not had any significant improvements in over 20 years and most components are well past their useful life. However, required water quality testing is current, and the system has had no significant violations or issues with water quality. Testing to date for disinfection byproducts (DBP), radionuclides (radon) and arsenic do not indicate any problems, even with the new EPA standard of 10 parts per billion for arsenic. A copy of the Water Quality Summary from the MDEQ website is included in Appendix G. Regular monitoring of the water supply will help to ascertain when and if these issues need further attention.

2.1 Treatment:
As documented earlier, treatment plant upgrades are needed if the treatment plant is to remain online as a source of water for the Town. In order to meet EPA turbidity requirements without discharging to waste, and the requirements of DEQ Circular 1, filter upgrades must be completed. Due to limited staffing, the treatment system must remain simple and reduce operator interaction.

The Town presently injects ortho-phosphate at the treatment plant and at Well No. 1 for purposes of lead-copper corrosion control. Chlorine is added at the treatment plant in order to maintain a system wide chlorine residual. The use of both of these chemicals could be reduced by 1/3 to 2/3's if leaks in the distribution system and "lost" water can be reduced, for an estimated cost saving of about $1,000-$2,000 annually.

Installation of a consolidated well field would reduce the operation and maintenance requirements of the system. If all wells are connected to a common header and treated together, one treatment plant would serve the entire water supply for the Town. It is estimated that operation and maintenance time could be reduced by half if the Town moved to a consolidated groundwater source.

2.2 Transmission:
The existing 8" cast iron transmission main is old and of inadequate capacity to meet fire flow demands. The 8" cast iron main is subject to more and more frequent repairs as it ages well beyond its useful life. The 10" PVC main appears to be in good condition and is still serviceable from the tank to Eastside Highway. Replacement of the 8" line in place was originally considered from the well field to Town. However, with the acquisition of easement from the Kelley's and MRL the same benefits to the system are available at a lower price. This option would also relocate the Town's water main from under Middle Burnt Fork Road allowing better access for repairs and maintenance.

2.3 Storage:
The need for additional storage is documented herein, to meet minimum conditions of DEQ Circular 1, Section 7.0.1. However, at this time the necessary information required to properly size the storage tank is not available. It is recommended that the Town complete metering and distribution system improvements to reduce lost water and provide accurate production and use records to determine proper sizing of the new storage tank. Sizing and location of the storage tank should be evaluated when this information becomes available.

2.4 Supply:
Although the pump in Well #1 was replaced in 2005, it is still only operating at about 50% efficiency, and due to the fact that Wells 2 and 3 are relatively shallow and are drilled into an unconfined aquifer, it is considered best to abandon them and drill new replacement wells. The susceptibility of Wells 2 and 3 is evident in the elevated nitrates (1.5 to 2.7 ppm) seen in these Wells compared to the deeper aquifer of Well No.1 (0.3 ppm).

A consolidated "well field" will allow adequate protection of the well heads and recharge area. A storage tank located at the well field would provide adequate contact time (CT) through the tank for chlorine disinfection and provide for future treatment options if required.

A control system to automatically turn on and off pumps with the water level in the storage tank is essential to efficient power use and providing adequate water in fire flow situations.

2.5 Distribution:
The need for increased flows in the downtown area for fire protection is well documented. Leaking mains and service lines in this aged piping are expensive and disruptive to repair, and lost water is wasting power and leaking disinfection and corrosion control chemicals into the groundwater which has a direct link to the Bitterroot River. Known leaky sewer mains and a heavy concentration of subsurface wastewater treatment systems in the developed areas around Town also have the potential to contaminate the water system. Replacement of aged piping in the Downtown area will provide increased flow for fire protection and will provide a leak-free reliable water system backbone through Town.

The static pressure in the Town's water system ranges from 35 psi on the eastern side of the system to over 105 psi on the west side of Town. The Town Council has received many complaints about inadequate pressure on the east side of the water system as well as high pressure on the west side of the system. In considering revisions to the water system and storage scenarios, provisions for reducing pressure on the west side of Town and increasing pressure on the east side of Town should also be considered.

2.6 Metering:
Approximately 31% of the water system users are un-metered and currently pay a flat rate for water service. Metering of all services will help Town staff identify changes in produced and sold water which will help identify potential problems with wells and possible leaks in the system. Metering will also provide accurate water use data for sizing of the new storage facilities in Phase IV.

3. Growth -

TABLE II.B.3.1.F. Projected Water Demands developed water system requirements to the year 2030. Future water use projections are based on community wide success in reducing "lost water" to 15% by 2030. If this is done, the required supply capacity in 2030 is 1,697 gpm. It should be noted that this capacity is only 117 gpd more than the current system supply. Population projections as developed earlier in this section are for continued steady growth at 1.9% annual to a population of 3,026 persons in 2030. The Project Improvements suggested by this PER are not driven by growth and development, but rather by the need to update an aging and deficient system for the present users. However, prudent planning for normal and expected growth is good management practice so that the upgraded system is not soon over capacity.

Although water and sewer rates were increased in April 2004, no rate increase have occurred since this time and currently the water system has a deficiency of funds of about 27.4% of their operating budget. Furthermore, there are significant improvements required in the storage, supply, and distribution in order for the Town to "catch up" to reasonable standards. The improvements recommended by this Report will not completely solve the systems shortfalls - but will bring the system into a manageable condition and provide the Town with the tools required to run a more efficient system. Scheduling and phasing of improvements has been considered and is discussed below:

Overall, the proposed improvements of this PER consist of five (5) separate and distinct projects:

1) Meter all remaining water system customers, complete leak detection studies, and efforts to identify "lost water".
2) Construct a new transmission main from the consolidated well field along ALC Way to the Town's distribution system.
3) Upgrade supply to meet water quality and quantity standards per DEQ & EPA requirements
4) Complete distribution system improvements with new mains to complete the system grid, up-size existing mains to provide for improved hydraulic capacity, and break the system into two pressure zones.
5) Construct a new water storage tank on the Twin Creeks Well Site along Middle Burnt Fork Road.

These five projects are unrelated to each other from a construction standpoint and can be programmed as five separately designed and constructed projects. However, they are interrelated from a systems standpoint and all ultimately need to be completed in order to meet current and future demands. The projects are listed in a recommended order of priority for possible phasing of the work.

4. Unresolved Problems -

Once the five Projects identified above are complete, there should be no known unresolved problems with the Town's water system. The improvements identified herein form a significant re-construction of most all components of the system, and the Project will take several years and phases of construction to complete.

D. General Design Requirements for Improvements

Water Model

The water model for the Town of Stevensville was originally developed in 1996 using WaterCAD, which is a computer program that aids with full water system analysis. Information such as elevations, pipe location, size and material, pumps, and tanks were already set-up in the model when PCI was retained in 2004 by the Town of Stevensville to begin work on the previous water system PER. This updated PER uses the same water model, however, field checks, survey information and further interviews with maintenance staff helped in cleaning up the model and re-calibrating it.

LiDAR information, from a report created by Watershed Sciences Incorporated dated August 20, 2008, was used to check all original elevations in the model. All elevations, on average, were approximately ±3 feet compare to the LiDAR elevation data. Another method of checking elevation accuracy is by evaluating the difference between field and water model static pressures. Eleven (11) flow tests were conducted on October 1, 2009 by PCI employees under the supervision of Stevensville maintenance staff in which static pressures as well as residual pressures for various flows were collected. The difference in static pressure ranges from 0.3 psi to 4.4 psi.

Present day domestic water demands for the Town were evenly split among the nodes in the model except for the nodes connected to the 8" cast iron main along Middle Burnt Fork Road. As mentioned, a leak detection survey estimates approximately 140,000 gpd (97.2 gpm) leaking from this 8" cast iron pipe. Therefore, to create an accurate model, two nodes connected to this pipe were given a demand of 48.6 gpm. As shown in **Table II.B.3.1.F**, the 2008 average day demand is 561 gpm, 2008 peak day demand is 2094 gpm, 2030 average day demand is 455 gpm, and 2030 peak day demand is 1697 gpm.

The model was calibrated by using the results from the eleven (11) fire flow tests mentioned above. The boundary conditions for October 1, 2009 were: 1.) Storage Tank Full; Water Treatment Plant producing 800 gpm, 2.) Well 1 On, Well 2 & 3 Off. Each fire flow test was replicated in the water model and the residual hydraulic grade line (HGL) results were checked against the field (HGL) results. If the deviation was greater than 12 feet (5.19 psi), adjustments were made to the model until the variation was less than 12 feet (5.19 psi). Twelve (12) is a reasonable variation allowing for the non-accuracy of fire flow equipment and other testing errors. The Hazen-Williams friction loss C-coefficient was primarily the item adjusted because our pipe sizes, materials, and elevations were already fairly accurate. C-coefficients chosen for the model can be seen in **Table II.D.1.A** and the calibration results for the Town are in **Table II.D.1.B**

Table II.D.1.A - Calibrated Hazen-Williams friction coefficient for various pipe material

Pipe Material	Hazen-Williams C-coefficient
1930's Cast Iron	63
1940's Ductile Iron	120
Newer Ductile Iron	140
Newer PVC	150

Table II.D.1.B - Calibration Fire Flow Test Results

Test #	Field Static HGL	Total Flow GPM	Field Residual HGL	Model Static HGL	Model Residual HGL	Delta Residual (Model - Field) HGL	Test Node	Flow Node
1	3555.83	1250	3544.28	3546.80	3467.20	-77.08	J-61	J-63
2	3553.08	530	3499.95	3546.70	3510.60	10.65	J-40	J-6
3	3551.03	920	3539.48	3546.70	3478.40	-61.08	J-12	J-26
4	3549.89	460	3515.24	3547.00	3523.00	7.76	J-55	J-57
5	3539.90	380	3489.08	3546.30	3481.30	-7.78	J-70	J-84
6	3548.71	840	3490.96	3546.90	3482.20	-8.76	J-59	J-52
7	3553.66	790	3507.46	3547.00	3498.30	-9.16	J-37	J-13
8	3548.48	890	3495.35	3546.80	3486.70	-8.65	J-27	J-29
9	3545.96	798	3485.90	3546.70	3487.70	1.80	J-18	J-21
10	3556.85	798	3485.24	3546.80	3496.70	11.46	J-89	J-87
11	3551.92	798	3510.34	3546.90	3507.40	-2.94	J-93	J-97

Other factors that might control the model calibration are water system unknowns such as fully closed or partially closed water valves, broken water mains, undocumented connections, etc. In addition to adding 97.2 gpm of "lost water" on nodes connected to the old cast iron 8" on Middle Burnt Fork Road, P-223 was considered partially closed. According to Stevensville maintenance staff, the 8" PVC water main just northeast of the high school, has had problems in the past. These problems since then have been fixed, but there is a chance, if the water model is properly calibrated, that there still might be some debris in the main or a partially closed valve. A high minor loss factor was added to P-223 to imitate a pipe with restrictive flow. The maintenance staff will investigate and check all valves. Scenarios in the water model for the future water system assume this problem is fixed and the pipe is flowing full.

Fire flow test #1 and #3 are outside the recommended variation of 12 feet (5.19 psi). Since most of the other fire flow tests, which were within the 12 feet variation, were performed near the areas of test #1 and #3, it is acceptable to remove these tests from the calibration set.

The design requirements and regulatory approvals for each element of this water improvement project include the following:

1. Treatment

1. General Design Standards: Design analyses and recommendations included in this report are based in part on Montana DEQ Circular 1 "Standards for Water Works" and "Recommended Standards for Water Works," 1982 Edition, prepared by the Upper Great Lakes Upper Mississippi River Board of Sanitary Engineers (Otherwise known as the "10 States Standards.")
2. Surface Water Treatment Rule - EPA's Long Term 1 Enhanced Surface Water Treatment Rule sets the maximum contaminant level goal (MCLG) at zero. Filtered systems must physically remove 99% (2-logs) of *Cryptosporidium,* 99.9% (3-logs) of *Giardia* and 99.99% (4-logs) of viruses while maintaining 0.2 mg/l disinfectant residual entering the distribution system. In order to achieve these goals, the turbidity levels in the combined filter effluent must not exceed 5 nephelometric turbidity units (NTU) at any time and a limit of 1 NTU in at least 95% of the measurements taken each month.

2. Transmission

1. Sizing of the replacement transmission main line has been done with the help of a water hydraulic model and with the goal of achieving the ISO recommended fire flows and peak demands throughout the distribution system. A deviation from DEQ 1 Section 8.5.3, if needed, should be sought in order to have a depth of bury on the transmission line in Middle Burnt Fork at 4 ½' of cover. The 10" PVC line installed in 1978 has 4' to 4 ½' of cover and has never exhibited a freezing problem. The very shallow depth to groundwater through this area prevents deep freezing. Significant cost savings in pipe installation could result from the shallow bury depth.

2. Requirements for the location of any new storage tanks are that the minimum working pressure anywhere in the system grid is 35 psi. Due to the elevation difference across town, pressures in the west end of the system currently exceed 105 psi. According to DEQ 1, Section 7.3.1., consideration should be given to pressure reducing devises on the main lines when system pressures exceed 100 psi. Division of the water system into two pressure zones should be considered.

3. All new main piping and valves will be AWWA approved. Service lines and fittings will be NSF approved. Chlorinated test water will be de-chlorinated and flushed to waste. Lines will be pressure tested to 1½ times working pressures.

4. When designing transmission mains the velocity and head loss during a fire flow event should be considered. The maximum water velocity, according to AWWA recommendations, should be limited to 10 ft/s and the head loss should not exceed 6 ft/1000 ft. Future domestic demand (1697 gpm according to Table II.B.3.1.F) and fire flow demand together during peak day is the worst case scenario for water main sizing

and will be used in the water model. There is more discussion on this in Section V of this report. See Appendix C for future average day and peak day available fire flow reports.

3. Storage

1. SIZING - The recommended total storage volume is based on ISO requirements for meeting fire flow plus 24 hour average day demand. It is assumed that all supplies will have back-up power to contribute to the fire flow.
2. DEQ 1 - Chapter 7, Finished Water Storage will dictate the required construction methods associated with the reservoir. Concrete and steel tank alternatives should be considered. In either case, the tank shall conform to AWWA standards for construction and coatings. In the case of concrete, it will be partially buried in the ground or, if steel, attractively painted and landscaped to soften views by the public. The Tank is to be disinfected per AWWA C652. Chlorinated water used for the disinfection process will be de-chlorinated and then sprayed on Town property as irrigation water.

4. Water Supply

1. Per DEQ 1, Chapter 3, The water supply will meet the peak day demand with the largest well out of service.

2. A Source Water Delineation and Assessment Report has been prepared by Western Groundwater Services for the Town. The Report meets the requirements of PWS-6. AMEC Geomatrix has prepared a PWS-6 for the new Twin Creeks well field.

3. The Town of Stevensville has filed rights to all of its existing wells and surface water sources. It has Statements of Claim on file with DNRC for the surface water sources and Provisional Permits for all existing wells. Water rights applications associated with the Twin Creeks Well Field have been filed with DNRC, and are currently in the process. Upon approval of the Twin Creeks Water Right, the Town will apply for a water rights transfer to the Twin Creeks Well Field. This process will be lengthy, but based on the obtained rights for all other raw water sources, few objections are anticipated.

4. Any new wells will be drilled and developed in accordance with DEQ 1, Chapter 3 and Title 37, Chapter 43, MCA and Title 36, Chapter 21, ARM.

5. The new pump house, plumbing, disinfection and chemical feed (ortho-phosphate) will be in accordance with the applicable sections of DEQ Circular 1.

6. Design considerations for the well field pumps is a little difficult because the new storage tank cannot be sized until all water services and sources have meters. With meters installed, system leakage areas are easier to locate. After most of the leaks are fixed, the domestic water demand for average day should be easily found. The total storage volume will be based on the new average day domestic demand. The water model will be the perfect tool to use to size the new well pumps after total storage is determined. The well

field will most likely be built before the new storage tank so the new well pumps will need to provide adequate fire flow for the water system with the existing storage tank in-place.

5. Distribution

1. Adhere to DEQ 1 - Chapter 8 Transmission Mains and Distributions Systems.

2. According to The Hydrant Flow Data Summary in Appendix C, needed fire flows (NFF) in the commercial areas downtown should be 3500 gpm, the school area should be 3000 gpm, and residential areas should be 1000 gpm. The existing water system with all sources producing (Water Treatment Plant, Well 1, 2 & 3) was analyzed in the model to check available fire flow (AFF). The fire flow analysis was performed for both average day and peak day domestic demand; available fire flow (AFF) was determined by sustaining a minimum zone pressure of 20 psi. If AFF was less than NFF, new water mains were added or existing infrastructure was upgraded until the AFF was equal to or greater than the NFF. See Appendix C for existing average day and peak day available fire flow reports.

6. Metering:

1. Meters will be sized to meet the required flow demands of the category of the user, whether residential or commercial. The Town anticipates installing meter pits at the right-of-way edge with remote read heads on all new service connections, where groundwater conditions allow.

III. Alternative Screening Process

There are many alternatives for each of the proposed major elements of this project. The proposed elements are: treatment, transmission, water storage, water supply, distribution improvements and metering. Some of the possible alternatives are clearly not feasible or are cost prohibitive. All considered alternatives are discussed below:

A.Water Supply and Treatment

Since different water supply options require different treatment options, these two items will be evaluated together. The options listed below should address all practical configurations for rehabilitation or replacement of the Town's existing water supply and treatment systems.

No Action: No action will perhaps have little immediate consequence to the Town, however, on a peak demand day, system needs may not be met and shortages may occur. Further, if a severe fire should occur at the same time, fire flows will be insufficient to properly control the conflagration resulting in the possible loss of life and property. Loss of any of the existing wells, by failure of antiquated equipment, by loss of power, or by loss due to contamination, will have a serious consequence to the integrity of the water supply. The "No action" alternative will not protect the health and safety of the citizens of Stevensville, and will not be considered in the Alternative Analysis in Section IV.

Other Water Suppliers or Systems: There are no other water suppliers or systems in the area with capacity to serve all, or a portion, of the Town of Stevensville's demands. Other water suppliers or systems are not considered in the Alternative Analysis in Section IV.

Rehabilitation of Existing Wells, Infiltration Gallery, and Treatment Plant: The rehabilitation of Well #1 was performed in 2006 and 2007. This resulted in a minor increase in capacity, but the well is still limited by excessive sand production at flows above 275 gpm (approximately 400lbs/day sand production). Rehabilitation of the other two (2) existing wells is also a possibility, however, the wells are relatively shallow (50'-75' with 28' to 30' static water levels) and are not adequately protected from contamination. Thus, in order to improve these wells, the wells must be deepened so that they enter a semi-confined aquifer thereby affording improved wellhead protection. In addition to rehabilitation of the wells, the existing infiltration gallery and treatment plant requires upgrades to meet the current EPA surface water treatment rules. This option presents some difficult practical, engineering and logistical problems due to lack of available space, and excessive expense for a system that will marginally meet the requirements of the Town. However, this option will be considered in the Alternative Analysis in Section IV for comparison.

Identify New Well Site(s): The Source Water Protection Plan, September 2000, (Appendix D) recommended new well supplies along the south side of Burnt Fork Road and above the Eastside Highway as likely producing sufficient water and having a lower susceptibility to contamination. A further study of possible production rates reached the same conclusions. Several well sites

have been investigated in the past, including test wells on the northeast corner of town at the old Foremost Creamery in the early 1990's, and a test well drilled at the current treatment plant site in the early 1960's. Recently a test well and hydrogeologic assessment have been completed on a piece of property south of Middle Burnt Fork Road as part of the development of the Twin Creeks Subdivision, and found this site to be suitable for locating a consolidated well field for the Town of Stevensville. Alternative well sites will be considered in the Alternative Analysis of Section IV.

New or Alternative Surface Source and Treatment Plant: The Bitterroot River is a Class B-1 rated water body, but the River Basin is closed to new surface water rights, with the exception of municipal supplies [MCA 85.2.344(2)(b)]. Nonetheless, surface water rights even for municipal use, would be expected to be highly contested. In addition, the regulatory requirements for use of surface water vs. the ready availability of good quality groundwater render this alternative moot. A new or alternative surface supply is not considered in the Alternative Analysis in Section IV.

B. Water Storage

Based on discussions with USDA Rural Development and TSEP, it would not be in the Towns best interest to size and design a water tank at this time. Due to the fact that the Town of Stevensville is currently unmetered, and that there is a large amount of leaks in the distribution system, sizing a tank based on current estimated usage and leaks would result in an oversized tank that may not be in the best interest of the Town. Over sizing of the tank could lead to water quality issues, and would add additional cost to an already expensive project. A detailed water use and fire flow analysis will be performed after the Town's leaks have been reduced through the proposed distribution improvements and there is at least one year of metered use records for the Town. From this information a more accurate and cost effective tanks sizing will be able to be performed.

No Action: Hydraulic analyses associated with the development of this PER have concluded that additional storage is needed to meet daily and fire flow demands as required by DEQ Circular 1. The existing 0.43 MG reservoir is inadequate in terms of capacity and if required may not be adequate to provide contact time for 4-log disinfection, depending on the source location. The current tank could possibly run out of water completely in a major fire event. Due to the fact that the Town is unmetered and the distribution system contains significant leaks this option will be considered in the Alternative Analysis in Section IV.

Once adequate information is available to size the storage tank, the following options should be considered:

Tank Replacement in Existing Location: Complete replacement of the existing reservoir is a possibility with a new tank in one of several locations. However, replacement in its current location would be impossible without severe disruptions to the delivery of water to Town. The

present tank appears to be in good condition (Tank Inspection Report, 2004) although the tank base dates to the late 1950's and the concrete lid was added in 1978. The location of the tank limits its use for gaining chlorine contact time unless all sources are piped to the tank before being returned to distribution. This option will not be considered in the Alternative Analysis in Section IV.

New Storage Tank with Removal of Existing Tank: Installation of a new storage tank could occur in several locations, and in several different forms (gravity, elevated, ground level boosted, etc.). The most desirable scenario would be to have the new storage tank located near the source and treatment facilities so it could be utilized for disinfection contact time if 4-log disinfection is required in the future. Upsizing the new tank and removal of the existing tank may prove to be more economical than maintenance of an aging concrete tank and the additional transmission main. This option will not be considered in the Alternative Analysis in Section IV.

New Storage Tank Keeping Existing Tank: Installation of a new storage tank could occur in several locations, and in several different forms. The most desirable scenario would be to have the new storage tank located near the source and treatment facilities so it could be utilized for disinfection contact time if 4-log disinfection is required in the future. However, keeping the current tank may prove to be an economical advantage to the Town, as well as providing the benefit of redundancy for tank maintenance. This option will not be considered in the Alternative Analysis in Section IV.

C. Transmission

No Action: The existing 8" cast iron main is far past its useful life and leaking badly. The 10" PVC main alone cannot deliver peak demand flows to the Town distribution system from the existing reservoir. No action will mean that the Town will have to rely on these lines for the foreseeable future to deliver water to the Town system. Frequent repairs to the 8" line can be expected to continue. Ravalli County has proposed reconstructing Middle Burnt Fork Road and will most likely restrict pavement cuts, limiting access to the line for emergency repairs. This may force the Town to abandon this line in place and rely solely on the 10" main to deliver flows to the Town. The capacity of the 10" main cannot supply peak demands or fire flows. The 8" main is believed to be the largest source of leaks in the Town's water system and needs to be rehabilitated or replaced; therefore the "No Action" alternative will not be considered in the Alternative Analysis in Section IV.

Rehabilitate 8" Transmission Main in Place: The existing 8" cast iron line could be rehabilitated in place by pipe bursting or splitting. However, pipe bursting is usually limited to an upsize of three pipe sizes (eg. 8-inch to 12-inch) and a length of 300-400 ft without causing excessive ground movement and requiring more powerful equipment. Based on the length of pipe that needs to be replaced and the pipe size required to meet the expected demands of the system; pipe

rehabilitation does not appear to be a logical or cost effective solution and will not be considered in the Alternative Analysis in Section IV.

Replace 8" Transmission Main in Existing Location: Replacement of the 8" cast iron main in its existing location will solve multiple problems for the Town of Stevensville. Installation of the main should include removal of the old wooden main to reduce the liability of the Town for collapses in Middle Burnt Fork Road. The size of the new transmission main will be selected to provide present and future peak demands and fire flows. Pipe material such as PVC and Ductile Iron will be evaluated for cost. Any pipe used must be AWWA approved. In the larger pipe sizes, costs can be very comparable and these pipe types should be specified as alternates, and the cost difference evaluated at that time of construction. Replacement of the 8" transmission main in place will be considered in the Alternative Analysis in Section IV.

Alternative Pipeline Routes: The route of the new pipeline along and within the right of way of Middle Burnt Fork Road is the most direct route to the Town distribution system; however, other routes are available and could provide the same benefits to the water system while minimizing the road repair costs to the Town. If alternate routes are chosen abandonment of the existing 8" line from the reservoir to town should be strongly considered. An alternate route may involve setting the pipeline in "virgin" areas or across open previously undisturbed land. Alternative routes may also have the potential for greater environmental impacts to local resources, greater distances and probable easement acquisition costs. However, given the potential cost savings associated with minimizing road repairs alternative pipeline routes will be considered in the Alternative Analysis in Section IV.

D. Distribution Improvements

No Action: This alternative does not address the problems of inadequate fire flow and frequent flushing required for the dead end mains in Town. The looping of dead ends and replacement of leaking and undersized piping in the system will help reduce the potential for contamination, and improve the currently inadequate fire protection that puts the Town and its citizens at risk. System leaks may also continue to increase if the system is not repaired and improved. The "No Action" alternative is not considered in the Alternative Analysis in Section IV.

Full Distribution Replacement: The full replacement of the water distribution system is not considered necessary, or financially feasible. A good leak detection program will identify sections of problem piping and hydraulic modeling will identify sections of undersized mains which are in need of upsizing. The full replacement of the distribution piping is not considered in the Alternative Analysis in Section IV.

Main Upsizing and Looping of Dead Ends: This alternative is designed to improve the overall efficiency of the distribution system and to insure that system flows and pressures will be adequate for fire protection even during peak demand periods. Areas of leaking piping

indentified in leak detection surveys must be repaired or replaced to reduce the amount of water leaking from the distribution system. The replacement of critical mains and completion of looped distribution will be considered in the Alternative Analysis in Section IV.

Pressure Zones: Due to elevations changes across Town, many residents have water pressure that is less than ideal and in many cases unsafe. On the west side of Town pressures can reach up to 110 psi, while pressure at the upper end of the distribution system can be as low as 35 psi. Depending on the storage location selected, division of the water system into two pressure zones may be required to provide adequate and safe pressure to all water system users.

E. Metering

No Action: The no action alternative maintains the current situation in Town, in which approximately 66% of the services are metered with the balance being unmetered. Currently all new services, and houses at transfer of ownership, are required to be metered, but there would be no concerted effort to meter all existing services on the system. This option will have several long term negative effects, namely, it will hinder the ability of the Town to quantify the extent of system leaks and it will likely prevent the Town from obtaining certain grants and loans for needed system improvements, as such funding programs normally require that all users be metered. This option is not considered in the Alternative Analysis in Section IV.

Metering of all services: This alternative involves the installation of meters on all remaining unmetered water services on the Town's water system. This option will enable the Town to account and bill for all water used, and better quantify system losses due to leakage. This alternative will help insure that the Town is eligible for grants and loans that will help support the water system improvements recommended in this PER. The technology of remote read-outs will greatly reduce staff time and allow monthly meter reading in a shorter period of time than is taken currently. Monthly reading of meters promotes water conservation and assists with the water funds cash flow. Full metering of the Town is considered a necessary part of the improvements and will be considered in the Alternative Analysis in Section IV.

IV. Alternatives Analysis

The water system alternatives that are reasonable for the Town to consider have been reduced to:

Water Supply and Treatment Alternatives

1. Rehabilitate Infiltration Gallery and Treatment Plant – Rehabilitate existing wells or move to well/wells in consolidated well field.
2. Identify new consolidated well field location

Storage Alternatives

1. No Action – Keep existing storage tank

Transmission Alternatives

1. Replace 8" cast iron main in place
2. Alternative transmission main routes

Distribution System Improvements

1. Main upsizing and looping of dead end mains
2. Addition of Second Pressure Zone

Metering

1. Meter all service connections

Each of these elements is more thoroughly discussed below.

1. Water Supply and Treatment Alternatives

A. **Description:** Based on the current and projected water use for the Town of Stevensville, improvements to the quantity and quality of the Town's drinking water are required. These improvements can be handled in a number of ways, but based on the alternative screening process the two most realistic improvement scenarios would be 1.) to rehabilitate the existing infiltration gallery and treatment plant located up Middle Burnt Fork Road and rehabilitate the existing wells or move to a small consolidated well field, or 2.) Abandon the current supply and move to an all groundwater well supply from a consolidated well field located in or near Town.

B. **Schematic Layout:** The two options listed above cover a large area. The rehabilitation of the existing wells and infiltration gallery would require improvements at the three well locations in Town and the infiltration facility and treatment plant located up Middle Burnt Fork Road (See current water system map in Appendix C).

The construction of a new consolidated well field has been investigated at the following locations and would require the drilling of three or four wells and construction of a pump house and treatment building which would all be located at the consolidated well field:

Creamery Well Site - A well site had been under consideration near the old Foremost Creamery in the NE corner of the Town and in 1990, a 6" test well was drilled to a depth of 550 feet BLS near the Creamery. An analysis on the feasibility of this well site by

Howard Newman, ultimately concluded 600 to 1000 gpm is available from aquifers from 300' to 330' BLS (*Newman*, letter of May 25, 1990). The Test Well site is not considered a feasible site today as sufficient land around the site is no longer available, and connection to the water distribution system would require additional pipeline and possibly storage and secondary pumping to meet chlorine contact times if required.

Treatment Plant Test Well Site - A test well had been completed near the treatment plant site in 1963 to 510 feet. Little is known about the well other than the "casing was pulled from hole; did not produce enough water".

Twin Creeks Well Site - As part of an annexation agreement with the Town of Stevensville, 4-6 acres of land on the south side of Middle Burnt Fork Road has been reserved for a municipal well field as part of the Twin Creeks Subdivision. A Source Water Protection Delineation (PWS-6), was performed by Geomatrix of Missoula in November 2007, and found the site suitable for locating a consolidated well field for the Town. This site provides adequate room to construct the well field, treatment facility, and additional storage. The site also fronts Middle Burnt Fork Road which provides easy access by Town Staff and provides connectivity with the existing water mains in Middle Burnt Fork Road. With its close proximity to Town this site would also reduce the required transmission main length to Town.

Based on the information available and the work completed by the Twin Creeks Subdivisions, the most likely site for the consolidated well field is the Twin Creeks Well Site. This site has adequate land available for a pump house and treatment facility, as well as room for an additional water storage tank in Phase IV.

C. **Operational Requirements:** The operational requirements of the two water supply and treatment options vary greatly. A surface water treatment plant utilizing a slow sand filter, as recommended by Welch Comer (February 2005), will require a Class II water operator when the Town's population exceeds 2,500 (estimated 2020). Based on the Treatment Plant PER performed by Welch Comer, a slow sand filter treatment plant would require the following manpower requirements under normal operating conditions:

- Full time operator 2-3 hours per day
- One backup operator (as required by DEQ)
- Cleaning operations for one filter bed:
    - One full time operator for oversight– 50 hours
    - Manual removal of Schmutzdecke – 50 man-hours
    - Mechanical wet harrowing – 12 man-hours

A consolidated well field would require the following manpower under normal operating conditions:

- Full time operator 1-2 hours per day

D. **Energy Requirements:** If rehabilitation is chosen the slow sand filter will require a raw water booster pump. The treatment plant is estimated to have power consumption of $1,500 to $2,500 annually (as outlined in the Water Treatment Plant PER, Welch Comer). In addition to the treatment plant power requirements there will be additional power required for approximately 500 gpm from the existing well supply. The well supply is assumed to be needed 12 hours/day for 6 months of the year. The pumping conditions are estimated as follows:

Total Dynamic Head = 261'
At 85% Efficiency 39 HP required to pump 500 gpm.
Kilowatts = HP x 0.7457 = 29.8 KW @ $8.31/KW demand charge = $2,975
Estimated annual runtime = 2160 hours @ $0.055/KWhr = $3,540
Total annual power cost = $2,500 + $2,975 + $3,540 = $9,015

If the infiltration gallery and the associated treatment plant are de-commissioned the energy requirements will be all in pumping the groundwater wells. If on an annual basis, 239.08 MG are to be pumped (after leakage reduction in 2030, TABLE II.B.3.1.F) and we assume an average 9.6 hour pumping day, the pumped rate is 1140 gpm. As above:

Total Dynamic Head = 400'
At 85% Efficiency 150 HP (2 wells) is required to pump 1140 gpm.
Kilowatts = HP x 0.7457 = 111.9 KW @ $8.31/KW demand charge = $11,159
Estimated annual runtime = 3504 hours @ $0.055/KWhr = $21,565
Total annual power cost = $11,159 + $21,565 = $32,724

E. **Regulatory Compliance & Permits:** If the treatment plant is upgraded, it must meet the requirements of DEQ Circular 1 as well as be capable of meeting the requirements of the Environmental Protection Agency's (EPA), Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR) and Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR). The Town of Stevensville is currently on track for completing the required e-coli monitoring for the LT2ESWTR. Water rights for all existing sources are in place and will be retained with this alternative. Rehabilitation of the existing wells should include provisions for meeting the EPA Groundwater Rule requirements for 4-log virus inactivation should they not pass EPA triggered source water monitoring as required by December 1, 2009. Sufficient capacity is not available from the existing wells to meet the requirements of DEQ Circular-1, Chapter 3 for source capacity. New wells if required would most likely be only one well short of an all groundwater source.

If a consolidated well field is chosen as the preferred alternative all elements of the source and treatment must comply with all requirements of DEQ Circular 1, Standards for Water Works. In addition, all new groundwater sources constructed after November 30, 2009 must meet EPA triggered source water monitoring requirements, or conduct compliance monitoring for 4-log virus inactivation. Source capacity must meet the requirements of DEQ Circular-1, Section 3.2.1.1.

F. **Land Requirements:** Rehabilitation of the Treatment Plant and Infiltration gallery would not require any additional land acquisition by the Town. Rehabilitation of the existing wells would require additional easement, which in some cases may not be available. Moving the wells to a consolidated well field would be the most efficient solution due to the fact that the Twin Creeks well field will be deeded to the Town prior to final plat of the Twin Creeks Subdivision, and already has public water supply well in place which was 72-hour pump tested at 1,100 gpm.

Moving to a consolidated well field would require no land acquisition by the Town of Stevensville. As part of the Twin Creeks Subdivision a parcel of land will be deeded to the Town for use as a municipal well field. The site is large enough to accommodate the wells, treatment, and future storage requirements. The Twin Creeks Subdivision has already gained approval of the PWS-6 and drilled the first well on this property.

G. **Environmental Considerations:** Environmental impacts from either of these alternatives will be minimal. The backwash from the upgraded treatment plant will be recycled as to not affect surface water turbidity. The construction of the new well field will withdraw water from a deep aquifer which has been shown to be very prolific, as shown in the AMEC Geomatrix *Hydrogeologic Assessment Report and Criteria Addendum Evaluation in Support of Application for Beneficial Use Permit* prepared for the Town of Stevensville. Removal of water from the aquifer for either alternative is not thought to be environmentally significant. Disturbance at either site will be kept to a minimum and avoidance of environmentally sensitive areas, such as wetlands will be avoided.

H. **Construction Problems:** Repair of the infiltration gallery may be subject to high groundwater tables in the infiltration gallery area (1'-3' BLS). Pumping of groundwater should be expected for any repairs to the infiltration gallery.

No construction problems are anticipated with the drilling of the consolidated well field. Although high groundwater is present, suitable soils exist at the well field site and roadways and foundations should not be a problem with proper construction techniques.

I. **Cost Estimates:** The following tables compare the estimated Project Costs, Annual O&M Costs, and the 40 year Present Worth for both Supply Alternatives. A 3% interest rate was used for all calculations in the 40 year Present Worth Analysis:

Table IV.1.A Treatment Plant Upgrade and 1,700 gpm well field

Item	Description	Qty	Units	Unit Cost	Total
1	Slow Sand Filter (Welch Comer PER)	1	LS	$1,899,400	$1,899,400
2	Supply Main-Plant to Tank-10" PVC	1100	LF	$45.45	$50,000
3	De-Commission Existing Plant/Supply	1	LS	$50,000	$50,000
4	Land acquisition Well Field	4	Acre	$25,000	$100,000
5	Access Road and Site Pad Well Field	1	LS	$20,000	$20,000
6	3 phase Electrical Service	1	LS	$10,000	$10,000
7	Production Wells, 450' 500-600 gpm	2	EA	$75,000	$150,000
8	Well Pumps- line shaft 50 HP	2	EA	$40,000	$80,000
9	Well House, electrical & chlorination	1	EA	$100,000	$100,000
10	Back-up generator & transfer switch	1	LS	$50,000	$50,000
11	Telemetry Control System	1	EA	$75,000	$75,000
12	Connect to existing 10" supply line	700	LF	$50	$35,000
Subtotal, Construction Cost					$2,619,400
Engineering, Design & Construction					$523,880
Total Project Cost					**$3,143,280**
Treatment Plant Salvage Value (based on 50 year life)				$759,760	
Well Salvage value (7+8+9 based on 50 year life)				$132,000	
Present value of salvage (P/F @ 3%)				**$203,410**	
Annual O & M Costs					
	Treatment Plant (Welch Comer PER)			$12,500	
	Well Production Energy Consumption			$9,000	
	Pump Replacement (25 year life)			$3,200	
	subtotal, annualized O & M Costs			$24,700	
	40 Year Present Worth of O & M (P/A @ 3%)			**$570,941**	
	Net Present Worth			**$3,917,631**	

Table IV.1.B Consolidated Well Field (2300 gpm)

Item	Description	Qty	Units	Unit Cost	Total
1	Surveys & legal	1	LS	$5,000	$5,000
2	10" Production well. Completed	3	EA	$117,500	$352,500
3	Submersible turbine pump (Twin Creeks Well)	1	EA	$15,000	$15,000
4	Abandon Existing Wells	3	EA	$2,500	$7,500
5	Access road and Site Pad	1	LS	$20,000	$20,000
6	Pump house / Treatment building	1	LS	$156,250	$156,250
7	Well House Plumbing and Valves	1	LS	$30,000	$30,000
8	350 kW Backup Power Generation	1	LS	$90,000	$90,000
9	Disinfection & corrosion control system	1	LS	$25,000	$25,000
10	Electrical service connection	1	LS	$15,000	$15,000
11	Fencing and Security	1	LS	$15,000	$15,000
12	Telemetry & Controls For Existing Tank	1	LS	$45,000	$45,000
SUBTOTAL, PRODUCTION WELLS, PUMPHOUSE & TREATMENT					**$776,250**
Contingency (10%)					$77,625
Engineering (15%)					$116,438
TOTAL NEW WATER SUPPLY WELLS, PUMPHOUSE & TREATMENT					**$970,313**
Treatment Plant Salvage Value (based on 50 year life)				$158,500	
Well Salvage value (2+3+9 based on 50 year life)				$157,000	
Present value of salvage (P/F @ 3%)				**$71,966**	
Annual O & M Costs					
	Well Field Treatment Plant			$10,400	
	Well Production Energy Consumption			$32,724	
	Pump Replacement (25 year life)			$3,200	
	subtotal, annualized O & M Costs			$46,324	
	40 Year Present Worth of O & M (P/A @ 3%)			**$1,070,779**	
	Net Present Worth			**$1,969,126**	

J. **Selection of Preferred Alternative:** The Town has historically been in favor of the infiltration gallery and treatment plant because of the perception of "free" gravity delivered water, as was initially conceived at the turn of the 20th century when Mill Creek was first tapped with wooden mains to Town. It has become apparent that with the EPA's Surface Water Treatment Rule requirements and the technical nature of design and operation of a Surface Water Treatment Plant that the water is no longer "free". In addition, pressures on water rights from all the consumers on the Burnt Fork drainage have made reliable delivery of the Town's claimed rights even more risky. In addition,

sensitivity of the filter plant to potential contaminant sources is considered to be HIGH (Appendix D). The interconnectivity of Mill and Swamp Creek with the Bitterroot Irrigation District Canal, which brings water all the way from Lake Como, is also a concern. A matrix comparison of the Supply Alternatives is in **TABLE IV.1.C**. A matrix system of evaluating the alternatives is employed. Impacts on the listed elements are rated from 1 to 3, with 3 representing the higher impact, greater difficulty, higher cost, etc. The alternative with the lowest total value is deemed to be in the best interest of the community.

Rating System

Less Impact ⇒ *Greater Impact*

1 *2* *3*

TABLE IV.1.C Water Supply Source Alternative Selection Matrix

	Treatment Plant & 900 gpm Well Field	De-Commission Treatment Plant & 2300 gpm Well Field
Operational Requirements	3	1
Energy Requirements	1	3
Regulatory Requirements	3	2
Land Requirements	1	1
Air Quality	1	1
Source Water Sensitivity	3	1
Flood Plain	1	1
Socio / Economic	1	1
Transportation	1	1
Noise	1	1
Biological Resources	1	1
Construction Problems	2	1
Cost	3	1
TOTALS	22	16

As can be seen from the Table, the preferred alternative is to de-commission the treatment plant and infiltration gallery and move the Town water supply to a consolidated well field and rely on groundwater wells for all source water needs.

2. Storage Alternatives

Based on discussions with USDA Rural Development and TSEP, it would not be in the Towns best interest to size and design a water tank at this time. Due to the fact that the Town of Stevensville is currently unmetered, and that there is a large amount of leaks in the distribution system, sizing a tank based on current estimated usage and leaks would result in an oversized tank that may not be in the best interest of the Town. Over sizing the tank could lead to water quality issues, and would add additional cost to an already expensive project. A detailed water use and fire flow analysis will be performed after the Town's leaks have been reduced through the proposed distribution improvements and there is at least one year of metered use records for the Town. From this information a more accurate and cost effective tank sizing will be able to be performed.

A. **Description:** In order to maintain present and adequate Town pressures, and to utilize the present tank volume, the new tank normal operational levels should be from 3543' to 3549' MSL (1988 NAVD). The existing treatment plant site lacks the space to accommodate a new reservoir, unless the present reservoir is dismantled first. This is not considered to be a viable option due to need for continued storage volume during the construction period. The Town may have opportunity to acquire property on the south side of Middle Burnt Fork Road and about 30 vertical feet below the existing treatment plant site. Thus, a tank at this site is expected to be a tall tank with a daily operation volume above the 3543' level. Options for an additional tank include concrete or steel tanks. A concrete tank has the advantage of being able to be partially "buried" in the ground affording a low profile and therefore shielded from neighboring views. Except for periodic cleaning of the interior, a concrete tank has little in the way of long term maintenance requirements. A steel tank is expected to have a lower initial cost, yet will require more maintenance with periodic coatings inside and out. A steel tank will need to be constructed completely above ground on a concrete pad making it more visible to the public. However, the tank can be shielded from neighborhood views with partial excavation and earth / landscaped berms.

   In addition to tank material and location of the tank, the tank type must also be considered. Two options include building an elevated storage tank, this could include a water tower or a tank built to meet the current operating levels, or building a ground level tank with a booster station at an elevation lower than the current operating levels.

   Elevated storage tank: An elevated storage tank can be constructed close to Town with a height sufficient to equal the existing tank. Finished storage will be at the 3543 to 3549 elevation. Elevated tanks are typically steel of the ellipsoid or hydro-pillar configuration. A concrete base with steel tank may also be an option.

   Ground level tank with Booster Station: A ground level tank can be placed at virtually any elevation if a booster station is utilized to provide system pressure instead of gravity

flow. This alternative will require less energy to lift the well water to the tank, but additional energy to pressurize the water system.

B. **Schematic Layout:** The existing tank and site will be utilized until metering and leak reduction can be completed and an accurate assessment of water use can be used to design the new tank. Adequate space will be secured at the new well field location for the construction of a new storage tank of approximately 1 million gallons.

C. **Operational Requirements:** The existing tank will be retrofitted with float controls and telemetry to control the consolidated well field in a lead –lag –lag –lag scenario. This will reduce the systems dependence on manual control by the operator and ensure that adequate water is available under all flow conditions.

D. **Energy Requirements:** Utilizing the existing tank will not require any additional energy as compared to elevated tank scenarios. Should ground level storage at the well field be chosen additional well capacity may be available based on the reduction in head pressure on the pumps.

E. **Regulatory Compliance & Permits:** No permitting will be required to use the existing tank.

F. **Land Requirements:** No additional land will be required to use the existing tank. Adequate land will be acquired as part of the Twin Creeks Well Field to construct a new storage tank of approximately 1 million gallons.

G. **Environmental Considerations:** No environmental disturbance will result from the use of the existing tank.

H. **Construction Problems:** No construction problems are anticipated.

I. **Cost Estimates:** The only item required to keep the new storage tank in service would be to repair the roof. Roof repair is estimated at approximately $25,000. Controls such as a pressure transducer and telemetry are covered in the consolidated well field cost estimate, and will be able to be utilized when a new tank is built.

J. **Selection of Preferred Alternative:** At this time the preferred alternative is to utilize the existing storage tank until adequate metering information is available to properly size the new storage tank.

3. Transmission Main Alternatives

A. **Description:** Based on the most recent leak detection survey, March 2006, the largest source of leaks in the Town's distribution system is the 8" cast iron water main in Middle

Burnt Fork Road. This main was installed in the 1930's and was constructed with leaded hub joints. Due to vibration and movement associated with traffic on Middle Burnt Fork Road and the railroad crossing, it is assumed that these rigid joints have begun to leak. The 2006 leak survey uncovered five (5) leaks with an estimated leakage rate of 217,080 gpd of which over 140,000 gpd was found in the 8" cast iron main in Middle Burnt Fork Road. This accounts for almost 30% of the "lost" water indicated by the production records and wastewater treatment plant measured inflows.

In addition to being the main source of lost water for the Town, the two mains running down Middle Burnt Fork Road are inadequately sized to provide adequate fire flow and peak domestic flows to Town from the new well field. Based on the results of the water model, the estimated peak demand of 1,697 gpm and the ISO required fire flow of 3,500 gpm are unable to be delivered to Town through these two mains. Increasing the main size to 16" from the well field to Town will allow the required fire and domestic flows to be delivered to the Town. Three possible routes have been identified for the transmission main from the well field and are shown on the proposed route map in Appendix C. No improvements are proposed to the 10" main from the well field to the existing storage tank. This line was installed in the 1970's and is in good condition. This line is adequately sized to carry the flow from the well field and provide additional flow under fire flow conditions.

B. **Schematic Layout:** The three proposed transmission main routes include the following:
Middle Burnt Fork Road: The Middle Burnt Fork Road option will replace the existing 8" cast iron main in place from the new well field to Eastside Highway in Stevensville. This option will have the least impact environmentally, as all disturbance will be in previously disturbed areas; however, the financial impacts due to the extensive road repair required by the Ravalli County Road and Bridge Department will likely make this the most expensive option.

ALC Way: Another option is to abandon the 8" cast iron main in place and install a new main along ALC Way, through the Stevensville School property, and connect to the proposed 12" upgrades on 6th Street. This option would increase the length of pipe installed, but a majority of the installation would occur in gravel roadway and City owned right of way which would significantly reduce the road repair costs.

Park Street: This option would place the new main out north of the Middle Burnt Fork Road right-of way from the new well field to Park Street and continue up Park and connect to the 12" upgrade in 5th Street. This option will require less easement to be completed, but may have higher costs due to road repair that would be required along Park Street.

C. **Operational Requirements:** Any of the above listed alternatives would be a drastic improvement as compared to the current configuration. The Ravalli County Road and

Bridge Department has expressed continued concern over the old wooden main and the leaking 8" main and their effect on the structural integrity of Middle Burnt Fork Road. A new transmission main would lower maintenance costs due to repairs, and increase the reliability of the water system.

D. **Energy Requirements:** The replacement of the leaking transmission main will dramatically reduce the pumping costs of the Stevensville water system. The leaks in the 8" cast iron main alone are estimated at approximately 100 gpm. Reduction of these leaks will improve the overall efficiency of the water system and reduce pumping and storage requirements.

E. **Regulatory Compliance & Permits:** Replacement of the 8" cast iron main will bring the Town into general compliance with DEQ Circular 1, Section 8. In particular Section 8.2.3 Fire Protection.

F. **Land Requirements:** The Middle Burnt Fork Road option would not require any additional land acquisition as it would replace the Town's water main in its existing location. A right of way encroachment permit would be required from the Ravalli County Road and Bridge Department to perform this work in the Middle Burnt Fork Road right of way. The Park Street route would most likely require additional easement from the Kelley property and the Stevensville Community Center property. The Town staff has indicated that these easements would most likely be easily obtained. The ALC option would require easement from the Kelley property and Montana Rail Link, which would most likely be easily obtained.

G. **Environmental Considerations:** Replacement of the transmission main will have little or no environmental consequence. The reduction in lost water will result in corresponding reductions in chlorine and phosphates leaking into the groundwater and associated pumping energy.

H. **Construction Problems:** Certain areas of Stevensville have seasonally high groundwater which may create additional construction costs. The risk of encountering high groundwater is equal for all proposed alternatives. The Middle Burnt Fork Road option as well as the Park Street option would require extensive work along Middle Burnt Fork Road. Construction in the tight right of way of Middle Burnt Fork Road could cause delays and may pose a hazard during construction.

I. **Cost Estimates:** Detailed cost estimates for all three routes are included in Appendix H. The general costs associated with each route are shown below:

II.2.a NEW SUPPLY TRANSMISSION MAIN & BURNT FORK RECONSTRUCTION	
Subtotal, New Supply Transmission Main	$ 948,846
Subtotal, Middle Burnt Fork Re-construction	$ 446,969
TOTAL, TRANSMISSION MAIN & BURNT FORK RE-CONSTRUCTION	**$ 1,395,815**
II.2.b NEW SUPPLY TRANSMISSION MAIN (Route 2 - Park Street)	
Subtotal, New Supply Transmission Main	$ 1,158,310
Subtotal, Road Repair	$ 298,635
TOTAL, TRANSMISSION MAIN & ROAD REPAIR	**$ 1,456,945**
II.2.c NEW SUPPLY TRANSMISSION MAIN (Route 3 - ALC Way to 5th Street)	
Subtotal, New Supply Transmission Main	$ 1,066,078
Subtotal, Road Repair	$ 135,903
TOTAL, TRANSMISSION MAIN & ROAD REPAIR	**$ 1,201,982**

J. **Selection of Preferred Alternative:** Based on the hydraulic model, any of the above proposed transmission main routes will provide the required domestic and fire flows to Town while meeting DEQ requirements and AWWA recommendations. A matrix comparison of the Transmission Main Alternatives is shown below. Impacts on the listed elements are rated from 1 to 3, with 3 representing the higher impact, greater difficulty, higher cost, etc. The alternative with the lowest total value is deemed to be in the best interest of the community.

Rating System

Less Impact ⇒ *Greater Impact*

1 *2* *3*

TABLE IV.3.C Transmission Main Alternative Selection Matrix

	Alternate A Middle Burnt Fork Road	Alternate B Park Street	Alternate C ALC Way
Operational Requirements	1	1	1
Energy Requirements	1	1	1
Regulatory Requirements	2	1	1
Land Requirements	1	2	2
Construction Problems	3	2	1
Cost	2	3	1
TOTALS	10	10	7

As can be seen from the selection matrix, the preferred alternative appears to be the ALC Transmission Main Route. This route will provide the greatest benefit for the cost to the Town.

4. Distribution System Improvement Alternatives

A. **Description:** The issue here is the proper selection of pipe sizes and replacements in the distribution system for optimum efficiency in supplying peak demands and fire flows throughout the Town. In order to determine the most cost effective solution for distribution system upgrades, the Town's water distribution system was modeled using Bentley WaterCAD. Schematics of the system and selected print-out of hydraulic calculations are presented in Appendix C.

In addition to the pipelines identified herein for replacement, other pipelines may be found during continued leak detection operations that warrant full replacement. According to Town staff, the main lines are sound, but copper service lines are corroded and leaking.

B. **Schematic Layout:** Schematic's for both the existing water distribution system and the proposed improved system are shown in Appendix C. The pipeline improvements were selected to reach the following goals:

1. Eliminate "dead-end" lines to improve water quantity, quality and reliability.
2. Provide the ISO required fire flow of 1,000 gpm in residential areas, 3,000 gpm at the School, and 3,500 gpm in the commercial areas (Main Street).

Results of the model lead to suggested pipeline additions and replacement which are summarized in Appendix C. The pipelines identified are needed to bring the present Town grid into compliance with ISO flow requirements and with sound engineering practices. The bulk of future growth in the Stevensville area is expected to be to the south and southeast of Town. This growth will be served by water main extensions funded by the developments in a pattern consistent with the Town's Water and Sewer Master Plan.

C. **Operational Requirements:** The installation of new and replacement pipelines can be expected to reduce the operational duties of the Water staff. Reduction in dead-end lines will reduce flushing activities and improve water quality with better circulation of chlorine and ortho-phosphates.

D. **Energy Requirements:** The installation of new and replacement pipelines will have little effect on the energy requirements of the water system. However, any reduction in leaks will reduce pumping costs for the system.

E. **Regulatory Compliance & Permits:** Looping the dead end lines and meeting ISO fire flow requirements will bring the Town into general compliance with DEQ Circular DEQ 1, Sections 8.2.3 "Fire Protection" and 8.2.4 "Dead ends". In addition, the completion of a looped grid system can be expected to help in the even distribution of chlorine and ortho-phosphates for improved water quality.

F. **Land Requirements:** No new lands are required for these alternatives. All main replacements and new lines are expected to be within existing public right-of-ways.

G. **Environmental Considerations:** These water main installations will have little or no environmental consequence, with the exception of any associated reduction in "lost water" and the corresponding reduction in chlorine and ortho-phosphates and energy costs.

H. **Construction Problems:** Certain areas of Stevensville, notably the northeast portion and along Middle Burnt Fork have seasonal high groundwater that will create additional construction expense. There are no other special considerations that need to be made.

I. **Cost Estimates:** Detailed cost estimates for recommended system upgrades are listed in Appendix H. It is recommended that the Town adopt a minimum water main size of 8" for hydraulic capacity. Pipe materials should be either ductile iron or PVC, both with AWWA approvals. The general experience is that in smaller sizes PVC is most cost effective, while ductile iron is usually more competitive in larger sizes. It may be good practice to specify either type for a specific project and let the market forces make the selection.

J. **Selection of Preferred Alternative:** Several alternatives and scenarios were tested in the hydraulic model. From the model the following improvements are recommended:

1. In its current condition the distribution system is unable to deliver the required fire flow throughout Town. The hydraulic model predicts that with average day flows 38 out of 118 junctions failed to deliver needed fire flows. During peak flow 112 out of 118 junctions failed to deliver required flows. The maximum available fire flow in the commercial areas was 1986 gpm at average day flow and 392 gpm at peak day flows.

2. According to The Hydrant Flow Data Summary in Appendix C, needed fire flows (NFF) in the commercial areas downtown should be 3500 gpm, the school area should be 3000 gpm, and residential areas should be 1000 gpm. The existing water system with all sources producing (Water Treatment Plant, Well 1, 2 & 3) was analyzed in the model to check available fire flow (AFF). The fire flow analysis was performed for both average day and peak day domestic demand; available fire flow (AFF) was determined by sustaining a minimum zone pressure of 20 psi. If AFF was

less than NFF, new water mains were added or existing infrastructure was upgraded until the AFF was equal to or greater than the NFF. See Appendix C for existing average day and peak day available fire flow reports.

3. Based on the results of the water model the following pipe upgrades are recommended to achieve NFF at all locations during peak day flows:

Table IV.4.A – Recommended Pipe Upgrades

See Appendix G for a Schematic of Proposed Improvments

Pipe #	Upgrade Description	Quantity	Units
37	12" Pipe	570	LF
38	12" Pipe	575	LF
39	12" Pipe	330	LF
12	12" Pipe	230	LF
180	12" Pipe	380	LF
72	12" Pipe	1000	LF
245	12" Pipe	540	LF
244	12" Pipe	500	LF
201	12" Pipe	525	LF
202	12" Pipe	280	LF
203	12" Pipe	450	LF
204	12" Pipe	365	LF
236	12" Pipe	165	LF
237	12" Pipe	370	LF
238	12" Pipe	1960	LF
247	12" Pipe	235	LF
239	12" Pipe	700	LF
Total 12" Upgrades		**9175**	**LF**
75	8" Pipe	365	LF
246	8" Pipe	350	LF
58	8" Pipe	350	LF
199	8" Pipe	372	LF
198	8" Pipe	340	LF
200	8" Pipe	144	LF
197	8" Pipe	325	LF
66	8" Pipe	75	LF
64	8" Pipe	150	LF
207	8" Pipe	215	LF
208	8" Pipe	75	LF
221	8" Pipe	750	LF
Total 8" Upgrades		**3511**	**LF**

V. Detailed Description of the Preferred Alternative.

The preferred alternative will include the following elements:

1. Metering: Metering is recommended for all un-metered services. Installation of meters in existing services should include leak detection and replacement of the services to the main where indicated. Accurate metering of all services and supplies will allow the Town to accurately track water use, quantify the leaks in the system, and generate revenue for the water system on a more regular basis. Remote radio read technology should be utilized to reduce staff hours in meter reading and to begin reading and billing of water use on a monthly basis.

2. Transmission: A new 16" transmission main from the Twin Creeks Well Field to the Town distribution system is required to deliver the required domestic and fire flows to the Town as required by DEQ Circular 1, and the 1996 ISO fire flow recommendations. The main will be located in a water and sewer utility easement along ALC Way and will head east through the Kelley and Montana Rail Link property to Phillips Street and then north on Park Street to 5th Street.

3. Storage: Until accurate metering data is available, the preferred alternative is to use the existing storage tank and 10" main to provide storage and peak flows to the Town.

4. Supply & Treatment: The Town should begin conversion to a consolidated Well Field. The preferred location is the Twin Creeks Well Field along the south side of Middle Burnt Fork Road. Transfer of the well field property to the Town is a condition of the Twin Creeks Subdivision approval, and the Town is currently working on an agreement with Anderson should the subdivision process not be completed. Twin Creeks has installed a test well and has confirmed the aquifer capacity and water quality. Once the supply is secure, the existing wells and treatment plant can be phased out of the system.

5. Distribution: Water distribution mains identified in the WaterCAD model should be replaced or installed as identified. This will bring the existing system into compliance with DEQ and ISO requirements. In addition, leaks identified during main replacement shall be repaired, leaking service lines shall be replaced to the curb stop, and all services shall be metered.

A. Site Locations and Characteristics

1. Meters will be installed on all un-metered services. Curb-side vaults will be constructed within the existing street right-of-way where required and groundwater conditions permit. Where possible, meter placement will be within the home.

2. 16" Transmission main will be installed from the new well field to Town providing a significant increase in capacity. The 8" cast iron main shall be abandon as required by DEQ Circular 1, Section 8.14. The ALC route appears to be the most financially responsible for the Town. Seasonally high groundwater will most likely be encountered and should be budgeted as a construction expense.

3. Storage The existing tank will be utilized until accurate data is available to size the new storage tank. At that time the location, size and type of tank will be determined. Adequate space for a new tank will be acquired at the well field site as part of the well field agreement.

4. Supply & Treatment: The development of a consolidated well field capable of 2300 gpm will require approximately 4-6 acres. Up to 8 acres was offered for a Town well field as part of the Twin Creeks Subdivision application and is currently under negotiation. A test well was drilled by the Twin Creeks Subdivision and confirmed adequate quantity and quality water (see Appendix D). Sufficient area will be acquired to adequately protect the well heads and provide a location for future storage needs.

5. Distribution improvements will be located within existing Town right-of-ways and easements. Replacements of pavement and some concrete will be necessary as part of these improvements.

B. Operational Requirements:
None of the proposed improvements require operation expertise beyond a Class 2 water operator, which the Town currently employs. The only new equipment for operation will be the telemetry system to control the well pumps and reservoir levels and a booster station to provide additional pressure to the upper end of the distribution system. After brief training, staff will quickly become familiar with the operation of this system. The well field control system should include data collection for continuous pump records and water production. Conversion to all metered accounts through-out the Town and a monthly read and billing cycle will allow full accounting for produced and sold water, and greatly improve the financial health of the water enterprise fund.

C. Impact on Existing Facilities:
The proposed improvements will benefit the Town's water system. Metering of all users will most likely reduce the water used by flat rate customers by 15%-30%. The impacts on the existing water facilities will be significant in that the improvements will greatly reduce the amount of water leaking from the system, and discontinue the use of aged and "at risk" supplies. Wells #1, 2 and 3 will be gradually phased out of production as new well supplies are brought on line. Wells 2 and 3 are particularly at risk for contamination and Well No. 1 is far past its useful life at near 60 years old and is starting to produce excessive amounts of sand.

D. Design Criteria

Design of these improvements will be in accordance with DEQ Circular DEQ 1, Standards for Water Works:

1. Metering: All new supplies will be metered with continuous recording to the control system. All service lines will be metered with a remote read system for monthly meter reads and billing. Meters shall comply with AWWA C700 and all piping and fittings shall be NSF approved. Full metering will allow the Town to accurately assess its water loss and account for all water sold to customers. Complete metering will easily pay for itself within the first few years, if leaks can be reduced and the Storage Tank sized on actual metered use.

2. Transmission: The transmission main has been sized by hydraulic modeling with Bentley WaterCAD to provide peak day plus fire flow from the well field to the Town. Alternative routes were evaluated based on cost, environmental impact, and their ability to provide adequate flow to the Town distribution system. The ALC route will allow the existing 8" cast iron main in Middle Burnt Fork Road to be abandoned and will provide a third connection to Town should other mains need to be shut down for repairs. The transmission main will be designed per DEQ 1, Chapter 8 and will utilize AWWA and ANSI/NSF approved pipe, fittings and valves.

3. Storage: The current tank does not meet the requirements of DEQ Circular 1, Section 7.0.1. However, improvements to the source and reduction of leaks in the system will provide more fire flow and make the existing storage last longer than it previously did. When accurate data is available, the new storage will be designed in accordance with DEQ Circular 1, Section 7.0.1, and be specified to meet AWWA and ANSI/NSF standards. The new tank will most likely be located at the Twin Creeks Well field to provide a means of providing contact time for 4-log disinfection if required in the future.

4. Supply & Treatment: DEQ 1, Chapter 3, Source Development applies to the new well sites. Water quality will be tested and must meet the requirements set forth in Title 17, Chapter 38, Sub-Chapter 2, of the Administrative Rules of Montana. The new groundwater source will be developed on the Twin Creeks Well Field property and deeded to the Town as a final plat condition of the subdivision. Pumps will be specified to meet the peak day demand with the largest producing source out of service. It is assumed that all wells will be developed at the same capacity to reduce the amount of wells required. The Town will need to make application for relocation and correction of water rights to DNRC as new well supplies are developed.

   It is assumed based on the water quality information obtained by AMEC Geomatrix that the only treatment that will be required for the new source will be chlorination and injection of corrosion control chemicals (orthophosphate blend). Controls, metering, and treatment will all be located in a well house on the Twin Creeks Well Field property. No treatment discharge is expected from the treatment required.

5. Distribution: DEQ Circular 1, Chapter 8, Transmission Mains, Distribution Systems, Piping & Appurtenances applies to the main replacements. Increases in main size are supported by the hydraulic modeling completed in WaterCAD, and are shown on the Preferred Alternative System Map in Appendix C. Industry standard, AWWA and ANSI/NSF approved, ductile iron or PVC piping will be bid as equals. AWWA recommendations for flow velocities and head loss limits will also be considered in the design of this project.

   The booster station required to provide additional pressure to Creekside Meadows subdivision will meet the requirements of DEQ Circular 1, Chapter 6. This booster station was approved by DEQ as part of the Creekside Meadows subdivision (see approval in Appendix C), but was never installed. The booster station will be located as shown in the approved DEQ plans.

E. Environmental Impacts and Mitigation

1. Affected Environment/Environmental Consequences - Based on the responses to the Uniform Environmental Checklist (see Appendix B), it can be concluded that the work will have no significant adverse impacts on the environment. The proposed improvements will have very little negative impact excluding the normal problems associated with any construction activity.

2. Mitigation - The typical problems associated with the construction work include equipment noise, dust, odors and impact on vehicular traffic. Enforcing the work hours, maintaining noise suppressants (mufflers) on the equipment, applying dust controls (water, dust screens, etc.) and providing temporary traffic signage and controls will help to minimize the temporary impacts associated with construction actions. The water main replacements in the Downtown area have been designed to be a block east of Main Street to minimize impact on the business community and reduce costs of working on a State Highway.

3. Correspondence - Responses to the Environmental Checklist are included in Appendix B. No adverse impacts to the proposed project were identified.

4. Exhibits/Maps – Soil descriptions and flood plain delineations are show with The Uniform Environmental Checklist in Appendix B.

F. Cost Summary for the Selected Alternative

Detailed cost estimates for the identified improvements are given in Appendix H.

1. Project Costs - As detailed in Appendix H, the following are summaries of the "Activity Costs" of the PHASE II and PHASE III Projects. In addition to these costs will be administrative, legal, and financing costs that are specific to each potential funding

source. Those costs must be included in the appropriate funding applications, and can be expected to be 5% to 7% of the "Activity Costs".

PHASE II IMPROVEMENTS

Water System Improvements Phase II Scope of Work and Estimated Costs		
Description		**Estimated Cost**
Meter Installation	$	243,072
Engineering & Contract Administration	$	24,026
Contingency	$	24,307
Metering Total	**$**	**291,405**
Transmission Main Installation	$	852,863
Road Repair	$	108,723
Engineering & Contract Administration	$	144,238
Contingency	$	96,159
Transmission Main Total	**$**	**1,201,983**

Phase II Improvement Summary		
Meter Improvements	$	291,405
Transmission Main Improvements	$	1,201,983
Total Phase II	**$**	**1,493,388**

Phase II Funding Summary		
Meter Improvements - USACE/WRDA 2008	$	175,000
Transmission Main Improvements - USACE/WRDA 2008	$	487,500
Total Phase II Funding Secured	**$**	**662,500**

Phase II Funding Needed		
Total Phase II Funding Needed	**$**	**830,888**

PHASE III IMPROVEMENTS

Water System Improvements Phase III Scope of Work and Estimated Costs		
Description		**Estimated Cost**
Water Supply Well Installation	$	380,000
Pumphouse & Treatment	$	396,250
Engineering & Contract Administration	$	116,438
Contingency	$	77,625
Water Supply & Treatment Total	**$**	**970,313**
Distribution System Improvements	$	1,537,183
Decommission Infiltration Gallery	$	70,000
Engineering & Contract Administration	$	241,077
Contingency	$	160,718
Distribution System Improvements Total	**$**	**2,008,979**
Pressure Reducing Valves & Booster Station	$	165,000
Engineering & Contract Administration	$	12,750
Contingency	$	16,500
PRV & Booster Station Total	**$**	**194,250**

Phase III Improvement Summary		
Water Supply & Treatment Improvements	$	970,313
Distribution System Improvements	$	2,008,979
Pressure Reducing Valves & Booster Station	$	194,250
Total Phase II	**$**	**3,173,541**

Phase III Funding Summary		
RRGL 2008	$	100,000
TSEP 2008	$	500,000
Total Phase II Funding Secured	**$**	**600,000**

Phase III Funding Needed		
Total Phase II Funding Needed	**$**	**2,573,541**

2. Annual Operating Budget – The annual operating budget for the period 2009 through 2014 has been estimated in HDR's rate study which is included in Appendix E. The Town is currently in the process of evaluating their current rates, and is prepared to adopt a new rate structure based on HDR's Rate Study. The Rate Study was prepared assuming that all remaining improvements including approximately $1 million for Phase IV improvements to storage would be funded with current grants and a loan for the remaining value. Any additional grant funding would lower the rate increases proposed by HDR and help make this project more affordable to the Town. HDR's rate study includes: revenue, O&M costs, capital improvements, debt service and reserves

3. Reserves - HDR's rate study, which is included in Appendix E, budgets for the creation of an Operating Reserve Fund, Capital Reserve Fund, and Rate Stabilization/Emergency Reserve Fund. The Town currently has only a Capital Reserve Fund with a balance of approximately $300,000.

VI. Recommendations and Implementation

A. Funding Strategy

The needs of the Stevensville water system are extensive. It will not be possible for the water users to fund such extensive needs from user rates alone. The Town is in need of grant and loan funds in order to complete the recommended Projects. It is proposed that this project be completed in 4 phases.

Phase I: Complete
Phase II: Metering and Transmission Main Improvements
Phase III: Consolidated Well Field & Distribution System Improvements
Phase IV: Storage System Improvements

The Town has received the following grants to help complete this project to date:

WRDA 2008 - $175,000, Phase II
WRDA 2008 Special Appropriation - $487,500, Phase II
RRGL 2008 - $100,000, Phase III
TSEP 2008 - $500,000, Phase III

Additional funding will be required to finish Phases II & III. It is the opinion of this PER that Phases II & III must be completed before Phase IV can be designed for proper sizing of the tank. Accurate water use data will allow for more accurate sizing of the storage tank, and reduction in leaks in the system will reduce the required size of the storage tank, saving the Town a considerable amount of money.

It is desired that the remaining funding for Phases II & III be obtained through grant and loan from USDA Rural Development.

Current water rates are shown in the Table below:

	Annual fees				current
Account type	base rate	irrigation	MDEQ fee	usage[1]	monthly cost
Flat rate 3/4" Service	$205.24	$32.90	$2.00	N/A	$20.01
3/4" Metered Service	$175.84		$2.00	$53.35	$19.27
1" Metered Service	$314.75		$2.00	$95.50	$34.35
1-1/2" Metered Service	$703.36		$2.00	$213.40	$76.56
2" Metered Service	$1,255.50		$2.00	$380.92	$136.53

[1] Usage is based on the 2003 metered 137,000 gal/year/EDU less 10,000 gal/quarter base allocation.

The typical average residential metered monthly bill as developed in Table II.4.1.A is $19.27 /month. The average 3/4" sewer rate is $35.09 (see Table II.4.2.A) and the combined water and sewer billing is $54.36 / month. The target rates for water and sewer from the Department of Commerce website for Stevensville are as follows: water only is $32.61 /month, wastewater only is $20.96 and the combined water and wastewater rate is $53.57 / month. The "target rate" is the amount the Agencies expect the water and sewer users to be paying for operation, maintenance and debt service before the system is eligible for grant funds. Stevensville is currently at approximately 101% of target with no debt service and a projected budget shortfall of approximately 15% for 2009. A 40% rate increase is proposed next year, and extensive expenses expected for both the water and sewer system in the near future.

The ultimate increase in water rate will depend on the success of the community in obtaining grants from the various programs. The rate study performed by HDR determined that water and sewer rates needed to be adjusted to meet the current operating expenses as well as to handle the debt service from the proposed improvements. The rate study projected a 40% increase in water rates and a 45% increase for sewer rates in 2010 if no further grant funding is obtained. A copy of HDR's rate study is included in Appendix E.

If no further grant funding is obtained the estimated increases in water rates to complete the project (including Phase IV) are shown below:

Projected Rate Increases w/o Additional Grant Funding	
2010	40.0%
2011	30.0%
2012	3.0%
2013	3.0%
2014	3.0%

B. Implementation

This Project has been developed in four phases in order to correct potential health and safety issues and repair major operational problems facing the system first. The completion of the hydrogeologic evaluation of the Twin Creeks Well Field by AMEC Geomatrix has allowed the Town to move forward with this project knowing that they have a viable well field which produces adequate quantity and quality water for the Town. Within each phase of this project are several separate elements, which may also be constructed as "stand alone" projects if needed. Some of these project elements are particularly suited to a specific funding source. The following is a listing of each project element and a brief discussion of the current funding sources.

PHASE I: **COMPLETE**

PHASE II: Total $1,493,387

II.1 Meter Improvements ($291,405) This improvement is necessary to accurately determine the actual amount of water produced and sold for the Stevensville water system. This improvement will promote water and energy conservation as well as the fair and equitable sharing of water supply costs to each user. Full metering of the system will allow for accurate sizing of the new storage facility in phase IV of this project. WRDA 2008 funds have been secured for the majority of this project. Approximately $30,078 of Town funds are required to complete this portion of Phase II.

II.2 Transmission Main Replacement & Road Repair ($1,201,982) This project was initially proposed as a joint project between the Town and Ravalli County governments, with the original preferred alternative being replacement of the 8" cast iron main in its existing location. The 8" cast iron main is one of the largest known sources of leaks in the Town's distribution system, and Middle Burnt Fork Road is in a poor state of repair and has been in need of repair for some time due to failing sub-grades and poor asphalt condition. After extensive negotiations with the county, adequate funds to repair the road to county standards could not be obtained from the Road and Bridge Department budget. The Town has requested that repairs to the road be delayed until at least May 1, 2010 to allow road crossings for the new preferred alternative and service line relocations to be completed before the road is repaired.

The new preferred alternative places the replacement main in the proposed right-of-ways of the Twin Creeks Subdivision, existing utility easements along ALC Way, an easement through the Kelley and Montana Rail Link properties and existing Town right-of-ways. Although this alternative increases the length of main required, a savings of approximately $300,000 is estimated due to reduced road repair requirements. This portion of Phase II has received funding through a special WRDA appropriation of $487,500. Approximately $714,482 of Town funds are required to complete this portion of Phase II.

PHASE III: **Total $3,173,542**

Storage upgrades have been removed from Phase III and moved to Phase IV. A reduction in scope will be required from TSEP to use existing grant funds for Phase III. A lack of accurate water use data could result in inaccurate sizing of the storage upgrades adding additional cost to the project and possibly cause water quality issues in the future. RRGL and TSEP grants have been secured for completing the work associated with Phase III. However a funding shortfall of approximately $2,573,541 still exists.

III.1 New Water Supply, Pumphouse & Treatment ($970,313) A new well supply is the preferred alternative to replace the aging infiltration gallery, treatment plant, and existing shallow wells. Property obtained from the Twin Creeks Subdivision and the Hydrogeologic assessment performed by AMEC Geomatrix have provided a suitable location for a consolidated well field adjacent to the Town's existing distributions system.

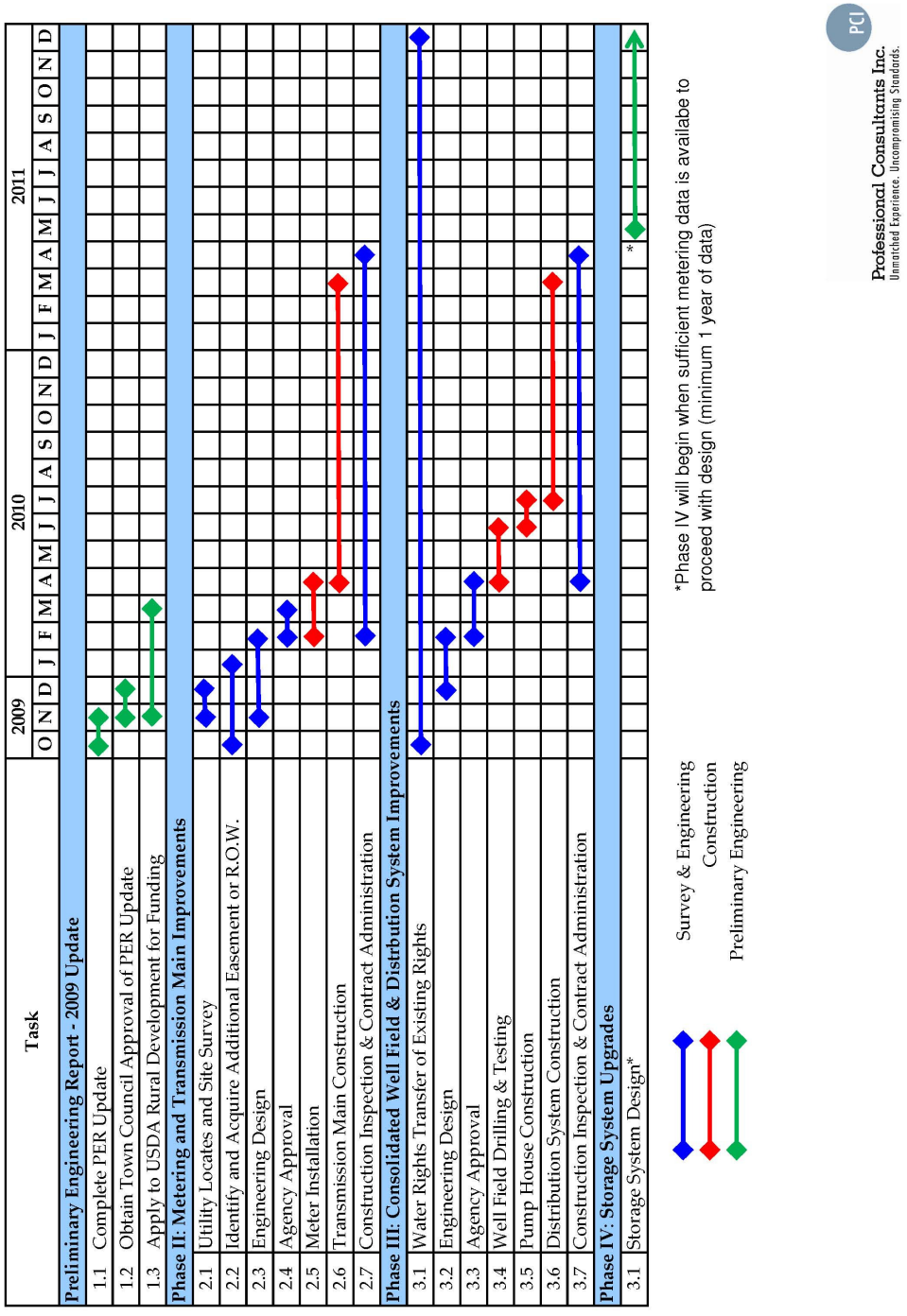
III.2 De-commission Infiltration Gallery & Treatment Plant ($87,500) Upon transfer to the new groundwater source the infiltration gallery and treatment plant must be properly abandon. It may be possible to sell or transfer the collection system to an agricultural use and there is a potential salvage value that has not been included herein. The treatment plant building should be retained and modified to storage and shop space for the water operations.

III.3 Distribution System Improvements ($2,115,729) are necessary to strengthen the flows within the existing system to provide ISO required fire flows, improve water quality and reliability, and reduce dangerously high pressures on the west side of Town. A 12" backbone through Town will provide the ISO required fire flows of 3,500 gpm to downtown businesses and provide water to the proposed industrial district along Eastside Highway.

Due to funding requirements this project must move ahead as quickly as possible. The longest item on the schedule will be the water rights transfer from the current sources to the new consolidated well field. This process has begun with the application for water rights on behalf of the Town by the Twin Creeks Subdivision. Upon approval of their water right, an application from the Town including a place of use change to include the Twin Creeks Subdivision will occur. This process is estimated to take at least two (2) years to complete. A preliminary schedule is shown in Figure VI.B.1.

Figure VI.B.1

Town of Stevensville - Water System Improvements - Preliminary Schedule



C. Public Participation

This PER Update is being prepared to amend the Stevensville Water System Improvements PER as amended September 2007. This report will be presented to the Stevensville Town Council on November 9, 2009.

Information and comments will be posted on the Town of Stevensville's Water Improvement Project Blog as the PER and water project progress. www.stevensvillewater.blogspot.com

Public comment on this PER Update will be documented as it is available.